FUNDAMENTALS OF OBSTETRICS – 1

Sex determination 00:00:36

↓

Decided by SRY gene

↓

Distal end of short arm of Y chromosome

Present → Male

Absent → Female

Turner's syndrome : 45XO → No Y chromosome → Female

Klinefelters syndrome : 47XXY → Y chr. Present → male

Other genes that favour
- Testis SOX-9
- Ovary RSPO-1, WnT-4

Best method of sex determination: Karyotyping

↓

Also best investigation to detect detect in chromosomal number

↓

Aneuploidy

- Triploidy: 69 chromosomes
- Trisomy: one extra chromosome(47)
- Monosomy: one less chromosome(45)

Genitalia 00:09:33

MC method used for sex determination Looking at external genitalia

Ambiguous genitalia

↓

Sex can't be determined by genitalia

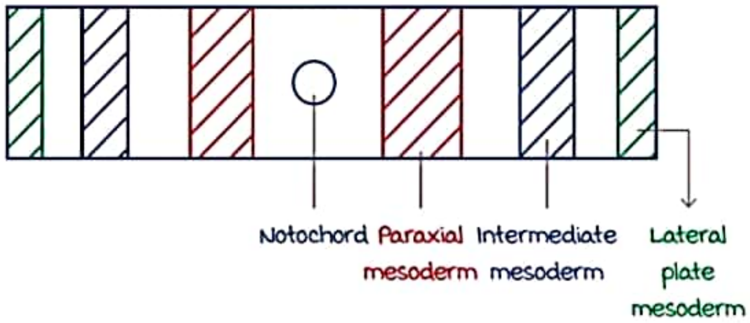
One more method – Barr bodies = X – 1

Normal ♀	Normal ♂	Turner's	Klinefelter's
0	1	0	1

Embryology

00:13:33

- Gonads
- Ducts
- Germ cells
- Ext. genitalia


Notochord
Paraxial mesoderm
Intermediate mesoderm
Lateral plate mesoderm

Note: most of the urogenital system is mesodermal in orgin →

Except urogenital sinus → Endodermal

Intermediate mesoderm

↓

Urogenital ridge (5 weeks of gestation)

- Gonads
  Ducts
- Renal system

Lateral plate mesoderm → Genitalia (dorsosomatic part)

Germ cells originate from Epiblast

Development of gonads 00:18:53

Till 6 weeks → Bipotential
↓
Derived from genital ridge
(application-In mullerian agenesis ovaries are normal)
↓
Differentiation depends on SRY gene

Present	Absent
↓	↓
medulla from testis	cortex form ovaries
↓	↓
7 weeks	8 weeks

First feature which distinguishes between testis and ovaries is formation of testicular cords

Ovaries → Due to absence of Y chromosome

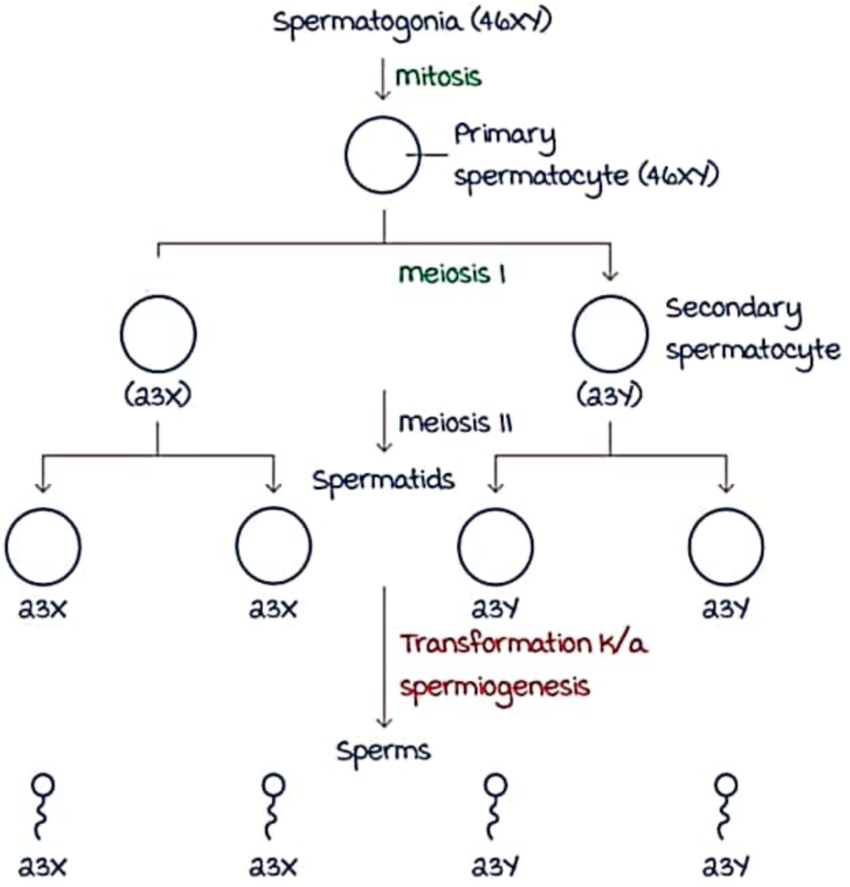
Turner's	Klinefelter's
↓	↓
Ovary	Testes

But for proper development of ovaries both x chromosomes are needed
↓
In Turner's syndrome
↓
Ovaries present
↓
Poorly developed - Streak gonads

Development of germ cells 00:25:15

Y chromosome present	Y chromosome absent
↓	↓
Spermatogonia	Oogonia

spermatogenesis:


Spermatogonia (46XY)
mitosis
Primary spermatocyte (46XY)
meiosis I
Secondary spermatocyte
(23X)
(23Y)
meiosis II
Spermatids
23X
23X
23Y
23Y
Transformation k/a spermiogenesis
Sperms
23X
23X
23Y
23Y

Spermatogenesis spermatogonia → Sperms

Spermiogenesis spermatid → Sperms

- Begins at puberty
  - 1 primary spermatocyte = 4 sperms
  - 1 spermatogonia = 16 primary spermatocytes
  - 1 spermatogonia = 16 X 4 = 64 sperms

Time taken for spermatogenesis 72-74 days
Average number of sperms produced per day = 100 million sperms/day

Spermiogenesis

00:35:26

1. Transformation of spermatids to sperms
2. No mitosis / meiosis
3. Time taken 12-14 days

Part in spermatid	In sperm
Nuclear material	Head
Golgi body	Acrosomal cap
mitochondrion	middle piece
microtubule / Centriole (9+2)	Tail / axial Filament

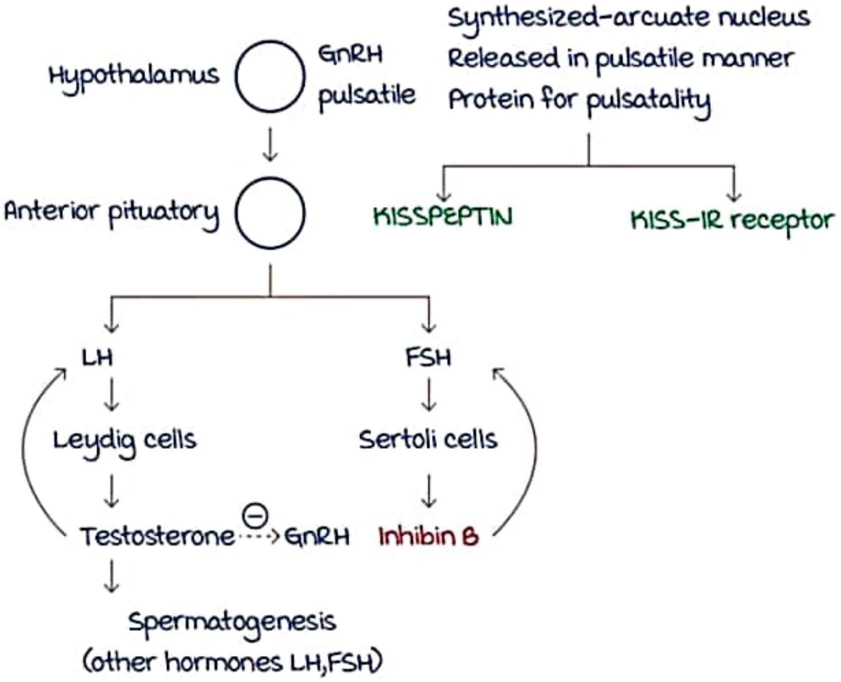
Sperm lack endoplasmic reticulum (specially RER)

Sperm

:38:06

1. Length 55 microns
2. Fertilizable span – 48-72 hrs
3. Sperms attain motility & maturity in caudal end of epididymis (not in testis)
4. Gene for motility CATSPER
5. Ion for motility Ca^{2+}
6. Sperms remain motile in female genital tract 12 hrs
7. Time taken for sperm to reach the ampulla of tube 30 mins

Hormonal support for spermatogenesis


Synthesized-arcuate nucleus
Released in pulsatile manner
Protein for pulsatality
Hypothalamus
GnRH
pulsatile
Anterior pituatory
KISSPEPTIN
KISS-1R receptor
LH
FSH
Leydig cells
Sertoli cells
Testosterone
⊖
GnRH
Inhibin B
Spermatogenesis
(other hormones LH,FSH)

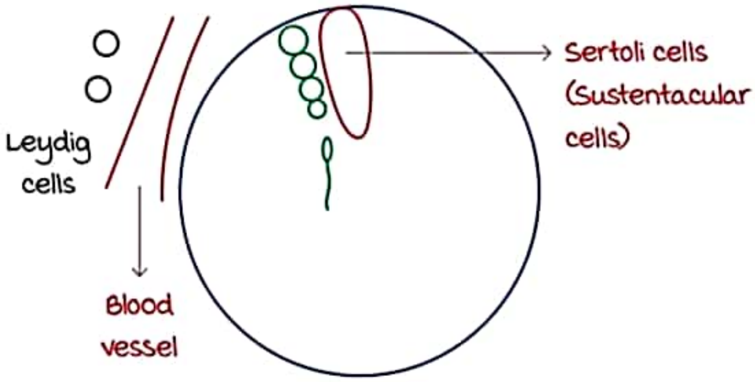
1. First stimulus to release testosterone hcg – from leydig cells

2. LH Receptors in ♂ – Leydig cells
   FSH Receptors in ♂ – Sertoli cells

3. Hormones needed for spermatogenesis
   - main → Testosterone
   - Others → LH, FSH

Leydig and sertoli cells

00:45:44

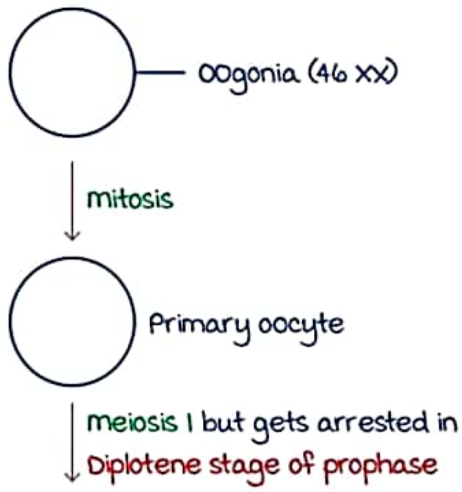

Leydig cells
Blood vessel
Sertoli cells (Sustentacular cells)

Blood – testis barrier
- Formed by → Sertoli cells
- Outside the barrier → Leydig cells

Oogenesis

00: 48: 00

- Begin in intrauterine life


Oogonia (46 XX)
mitosis
Primary oocyte
meiosis I but gets arrested in
Diplotene stage of prophase

Remain arrested till puberty
K/a Dictyate state → This state is absent in spermatogenesis
↓
Primary oocyte gets surrounded by follicular cells

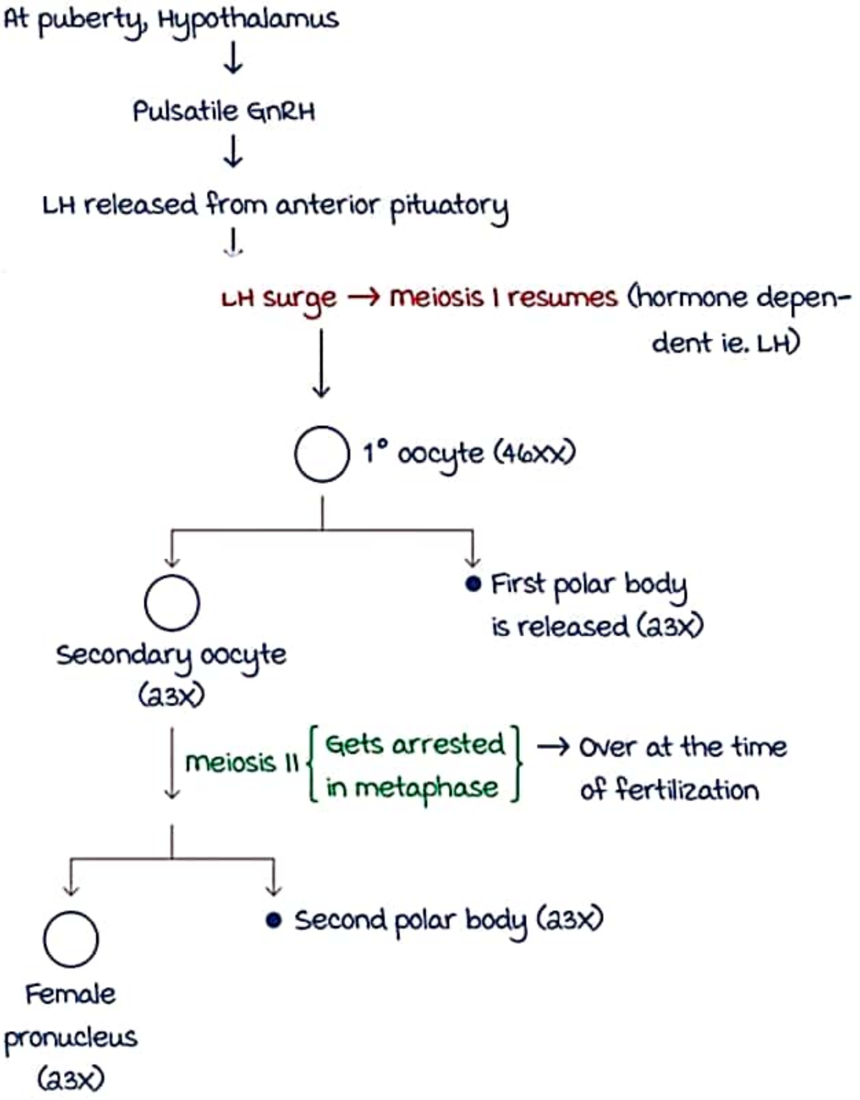
Cortex → Granulosa cell
Medulla → Theca cells

Granulosa cell + Theca cells = Primordial follicle

Tests for ovarian reserve

00:54:01

When number of follicles in ovaries becomes zero
↓
Ovarian failure / menopause


At puberty, Hypothalamus
Pulsatile GnRH
LH released from anterior pituatory
LH surge → meiosis I resumes (hormone dependent ie. LH)
1° oocyte (46XX)
Secondary oocyte (23X)
First polar body is released (23X)
meiosis II
Gets arrested in metaphase
→ Over at the time of fertilization
Female pronucleus (23X)
Second polar body (23X)

Ovulation

01:00:17

- Release of secondary oocyte from primary oocyte

LH surge → meiosis I resumed
↓
Ovulation

- Time between LH surge & ovulation 32-36 hours > 24-36 hours

1st Polar body is released at the time of ovulation

2nd Polar body is released at the time of fertilization

Oogenesis special points

01:03:42

- Oogenesis begins in intrauterine life(IUL)
- Ova-largest cell in the body = 120 μ

- Size of resting follicle: 0.02 mm
- Size of follicle just before ovulation = 18-20 mm
- Fertilizable span of ovum = 12-24 hrs

Time table of events

1. Germ cells reach yolk sac at 3 weeks
2. Germs cells reach gonads at 6 weeks
3. Oogonia formed at 9 weeks
4. Primary oocyte formed at 12-16 weeks
5. Follicle formation begins by 15-20 weeks
6. Follicle formation completes by 22-24 weeks

Number of follicles

- max at 20 weeks of IUL (5th month) 6-7 million
- Birth 1-2 million
- Puberty 4-5 lakhs
  ↓
  Only 500 follicles mature in entire lifetime

1000 follicles undergo atresia every month

Initial recruitment of follicles

↓

Hormone independent

Testosterone

01:12:23

Testosterone production

- Begins at 7-8 weeks of life
- Maximum
  ↓
  15 weeks of life
  ↓
  Decrease
  ↓
  Remain low till puberty
  ↓
  @ 17 years of age = Adult male
  ↓
  Testosterone in males 5-7 mg/day
  ↓
  Free testosterone-0.5 to 3.1

Active space

Bound = mainly to SHBG,albumin

↓ Estradial ↓ DHT

Testosterone $\xrightarrow{\text{Aromatase}}$ Aromatase Estrogen

⇓

Amount = 50 mcg / day
20% in testis
Rest in adipose tissue

Role of estrogen in male

1. ↑ bone mineral density
2. Closure of epiphysis of long bones
3. maintenance of body fat
4. Sexual function

Estrogen excess in ♂: Gynecomastia

II Testosterone $\xrightarrow{\text{5-α Seductase}}$ DHT (Dihydrotestosterone)

↓

most potent androgen
Testosterone: DHT = 10 to 15 : 1

Note : Transition meiosis a/k/a meiosis I

FUNDAMENTALS OF OBSTETRICS – 2

Fertilisation

00:00:15

- When the sperm reaches female reproductive tract

↓

1) Capacitation – Ability of sperms to fertilise ova
Occurs in female reproductive tract

↓

Begins in – Cervix
majorly in – Fallopian tube

> Sperms become motile in – Caudal end of epididymis
> Sperms become hypermotile in – Fallopian tube

- Within 30 mins – Sperms reach fallopian tube

↓

2) Acrosomal reaction – Sperm attaches to zona pellucida
(layer around secondary oocyte)

↓

Facilitated by receptors – ZP1
ZP2
ZP3

3) Cortical reaction – Sperm penetrates the zona pellucida and
reaches cortex of 2° oocyte

↓

With the help of ZP_2, Ca^{2+} ions

↓

And enzymes are released from cortex

↓

4) Zona reaction – These enzymes make zona pellucida
impermeable to other sperms

∴ Function of zona pellucida – Prevents polyspermy

Active space

Fertilisation – Zygote formation

00:08:17

- The sperm unites with secondary oocyte

↓

Fertilisation – Occurs in ampulla of fallopian tube

↓

Zygote is formed

↓ ← After 20-30 hours

2- Cell stage

↓

4- Cell stage

↓

8- Cell stage

↓

16 – Cell stage – called morula (mulberry – shaped)

- For 3 days after fertilization → Zygote remains in fallopian tube

↓

Nutrition is provided by Secretory cells of fallopian tube

- The zygote (morula) moves into uterine cavity with the help of two factors

Peristalsis in tube (main factor) | movement of cilia

Peristalsis in tube (main factor)

↓

factors that ↓ tube peristalsis

↓

↑ risk of ectopic pregnancy

↓

e.g- Progesterone, copper – T, tubal surgeries

- Fallopian tube has three types of cells

↓

Columnar cells

Secretory cells

PEG cells – function not known

Implantation 00:14:35

- Fourth day after fertilization / Day -18 of menstrual cycle

  ↓

  morula enters uterine cavity

- 5th day after fertilization

  ↓

  Zona pellucida is lost – Zona hatching

  ↓

  Fluid enters morula

  ↓

  Forms blastocyst

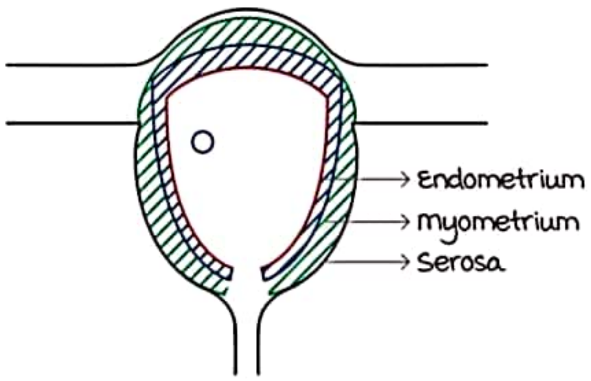
  ↓

  Attach to endometrium of uterus

  ↓

  Called implantation

Intra decidual sign 00:19:12



Types of implantation

Superficial implantation

↓

Attaches superficially to endometrium

Interstitial implantation

↓

Implanted deep inside endometrium

↓

Occurs in humans

On ultrasound – The normal uterine cavity appears as Straight white line

↓

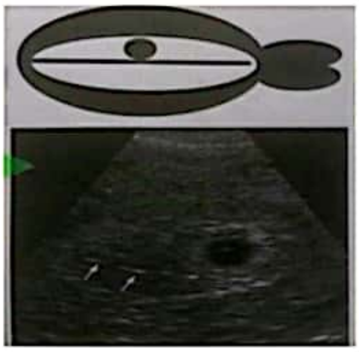
The blastocyst does not disturb central cavity complex / uterine cavity

↓

Intra decidual sign

↓

1st sign of pregnancy



- The endometrium – in pregnancy is called Decidua

3 parts

Decidua Capsularis	Decidua Basalis	Decidua parietalis
↓	↓	↓
Separates blastocyst from uterine cavity	Separates blastocyst from myometrium	Rest of the Decidua

Important points on implantation

00:26:12

- Implantation occurs in the form of – Blastocyst
- Begins by – 6 days after fertilization (Day – 20 of menstrual cycle)
- Implantation window – Day 20 – Day 21
- Completed by – 10 days after fertilization
- m/c site – upper posterior part of uterus

Active space

- Implantation is Eccentric (on one side)

Unequal growth of uterus
↓
Piskacek sign

- True gestational sac eccentrically located
- Pseudogestational sac is centrally located (the whole decidua is thickened)

- Type of implantation – Interstitial implantation
- Sign on ultrasound – Intradecidual sign
- Hartmann sign/placental sign – Bleeding at the time of implantation
- Phases of implantation

Phase	Main transmitter
Apposition	Selectin
Adhesion	Integrin
Invasion	Metallo protease

- Thickness of endometrium at the time of implantation : 10-12 mm
- Thickness of endometrium

After menstruation	At ovulation	In secretory phase
0.5 mm	2-3 mm	5-6 mm

Decidua

00:33:07

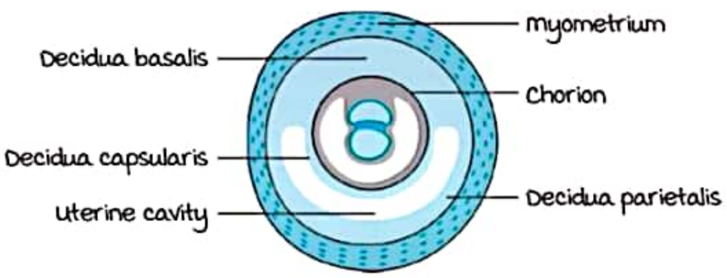
- Endometrium after implantation – Decidua

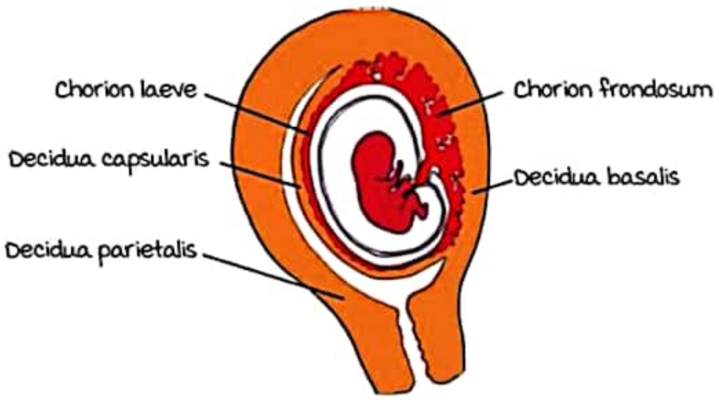
3- parts

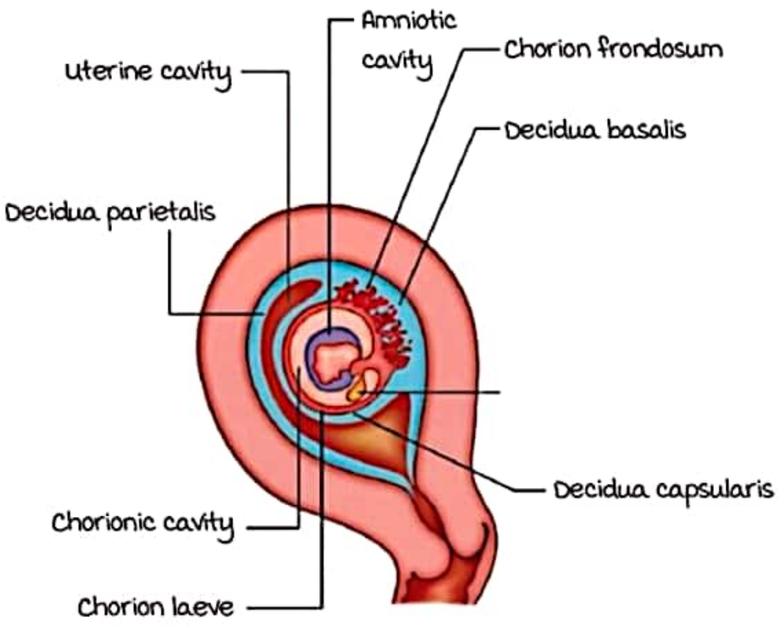
Decidua Basalis | Decidua Capsularis | Decidua parietalis

Decidua Basalis
↓

- Functions → Site for formation of future placenta
  → Forms the maternal side of placenta


Myometrium
Decidua basalis
Chorion
Decidua capsularis
Uterine cavity
Decidua parietalis


Chorion laeve
Chorion frondosum
Decidua capsularis
Decidua basalis
Decidua parietalis


Amniotic cavity
Uterine cavity
Chorion frondosum
Decidua basalis
Decidua parietalis
Decidua capsularis
Chorionic cavity
Chorion laeve

Fusion of decidua capsularis and decidua parietalis 00:40:23

- Blastocyst grows and occupies uterine cavity

↓

Decidua capsularis & Decidua parietalis Come closer to each other

- Decidua capsularis and decidua parietalis fuse or uterine cavity obliterates

↓

At 14–16 weeks of pregnancy

- For twin pregnancy

2 ova fertilized by 2 sperms

In same cycle
↓
Superfecundation
↓
Seen in humans

In a different cycle
↓
Superfetation
↓
Not seen in humans

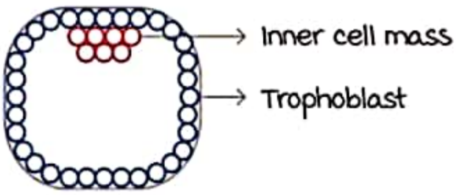
- Superfetation – in humans – theoretically is possible till

↓

14–16 weeks

Blastocyst

00:45:47



- Blastocyst has – 58 cells

5 cells
↓
Forms entire fetus

53 cells
↓
Form trophoblast

- The trophoblast – 8 days after fertilization

Cytotrophoblast

Near decidua Basalis
↓
Form villi like structure
↓
Chorion frondosum forms fetal side of placenta

Rest of chorion remains smooth
↓
Chorion leave
↓
Forms chorion

Prevents PIH

Syncytiotrophoblast
↓
Hormone factory of placenta

Trophoblastic invasion 00:51:06

- The cytotrophoblast – Converts maternal arteries from (extra villous cytotrophoblast)

↓

High resistance to low resistance vessels

↓

Known as trophoblastic invasion

↓

Occurs in 2 phases

Begins ↓ At 12 wks

2nd phase ↓ At 16 wks

This maintains uteroplacental blood flow

- If trophoblastic invasion is absent

↓

The resistance in maternal vessels is high and volume ↓

Causing uteroplacental insufficiency

Leads to

PIH (Pregnancy induced hypertension)

IUGR (Intra uterine growth restriction)

Placenta accreta

- Function of cytotrophoblast controlled by

↓

Natural killer cells of decidua

Double decidual sac sign on ultrasound 00:55:50

- Blastocyst grows and occupies uterine cavity

↓

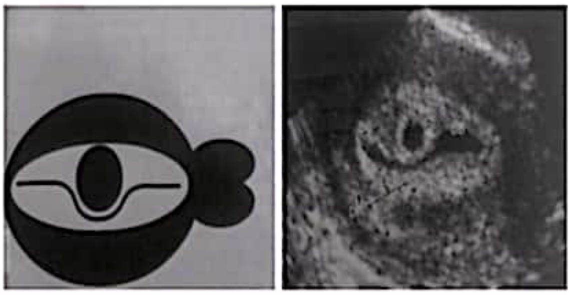
  - Indents central cavity complex
  - Decidua capsularis and parietalis – forms 2 rings around blastocyst

↓

Double decidual sac / Ring sign

↓

Inner ring – Decidua capsularis
Outer ring – Decidua parietalis



Seen only in intrauterine pregnancy (true gestational sac)

PLACENTA – 1

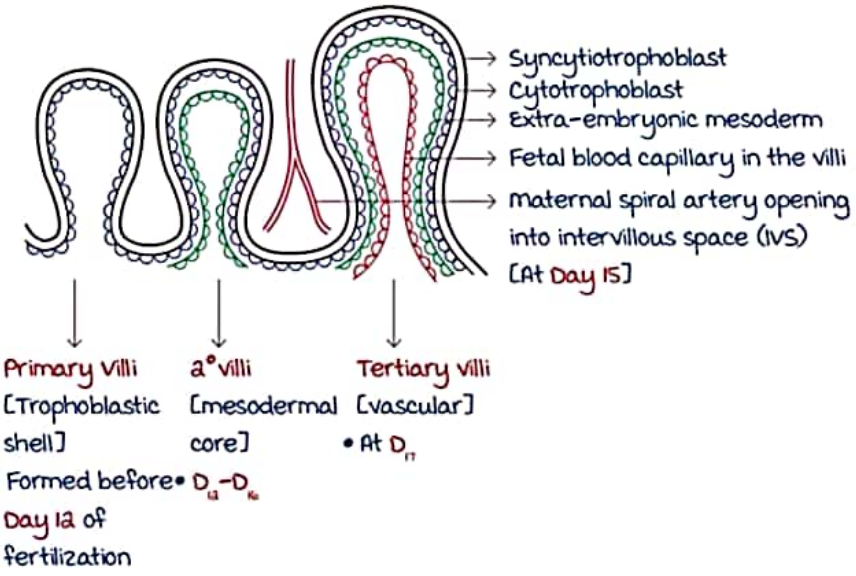
Placenta – introduction 00:00:20

1. Human placenta
   - Discoid – Disc-like in shape
   - Deciduate – Sheds off after delivery
   - Hemochorial – Lies directly in contact with maternal blood
2. Weight of placenta at term – 500 gms
3. Ratio of weight of placenta : fetus = 1 : 6
4. Weight of placenta = weight of fetus at 17 weeks of pregnancy
5. Named cells

Named structure	Site
1. Hofbauer cells	Placenta
2. PEG cells	Fallopian tube
3. Langhan cells	Cytotrophoblast
4. Nitabuch layer	Fibrinoid degeneration – between chorion and decidua

- Zika virus can infect Hofbauer cells

Placenta – formation 00:04:25


Syncytiotrophoblast
Cytotrophoblast
Extra-embryonic mesoderm
Fetal blood capillary in the villi
maternal spiral artery opening into intervillous space (IVS) [At Day 15]
Primary villi [Trophoblastic shell]
• Formed before Day 12 of fertilization
2° villi [mesodermal core]
• D_{12}–D_{16}
Tertiary villi [vascular]
• At D_{17}

Placental membrane/Barrier

Structures separating maternal blood from fetal blood

[Outside ↓ Inside]

- Suncutiotrophoblast
- Cytotrophoblast
- Extra embryonic mesoderm
- Fetal capillary endothelium

- maternal spiral artery is not included in the placental barrier structures

  Reason: Cytotrophoblast replaces the lining of maternal arteries

  ↓

  maternal artery converted from high resistance → Low resistance

  ↓

  Trophoblastic invasion

  [This prevents PIH (pregnancy induced hypertension)]

Placental circulation

00:15:26

Placental circulation

↓ Uteroplacental [in IVS]

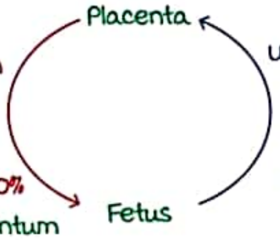
- Established on Day 15
- Number of spiral arteries opening in IVS
  ↓
  120
- O_2 saturation in IVS → 65-75%
- Partial pressure in IVS → 35-45 mmHg
- Uteroplacental blood flow at term [36 weeks]
  ↓
  500-750 ml/min
- Uterine blood flow at term = 750ml/min

↓ Fetoplacental [in villi]

- Established by Day 17 after fertilization
- Fetoplacental circulation at term
  ↓
  400 ml/min
- Fetal blood flow at term
  ↓
  125 ml/kg
- Rate of delivery of oxygen to fetus
  ↓
  8ml/kg/min

* IVS = intervillous space

Umbilical Artery and umbilical vein:


Placenta
Fetus

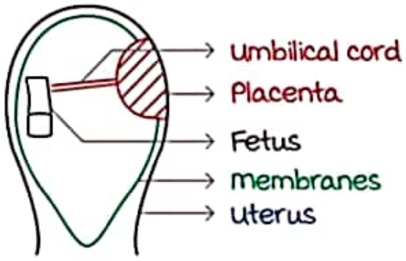
Umbilical vein
- Carries oxygenated blood
- O_2 saturation = 70-80%
- Remnant → Ligamentum teres

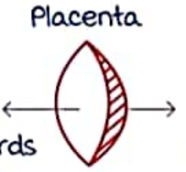
Umbilical Artery
- Carries deoxygenated blood
- O_2 saturation = 50-60%
- Remnant → medial umbilical ligament

- Remnant of urachus forms median umbilical ligament
- Umbilical artery- medial umbilical ligament (amul)
- Remnant of Inferior Epigastric Artery → Lateral umbilical ligament

Anatomy of placenta at term

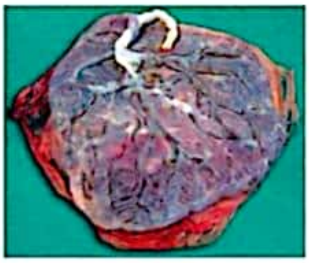
00:24:30

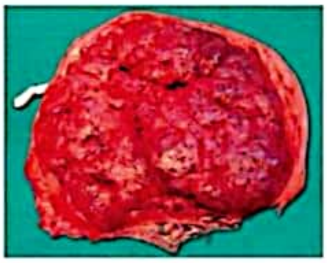

Umbilical cord
Placenta
Fetus
membranes
Uterus



Fetal side
- [Comprises of cords and membranes]
- Forms 4/5th of placenta

maternal side
- [Cotyledons limited by fissures]
- Forms 1/5th of placenta





Fetal side	maternal side
• Formed of chorion frondosum / Cytotrophoblast / Trophoblast	• Formed by decidua basalis
• Comprises of 4/5th of placenta	• Comprises of 1/5th of placenta
• Shiny, grey in colour	• Dull red in colour
• Fetal membranes and umbilical cord is attached	• Lobes[polygonal areas] ↓ Lobules / Cotyledons

Note :

- Functional unit of placenta → Cotyledons
  The area supplied by the main stem villi and all its branches
- USG for localization of placenta → 3rd trimester
- Thickness of placenta →
  - At term = 2.5cms
  - Thickness ↑ by 1mm every week
  - At 40 weeks = 4 cms (40 mm) [maximum]

Thickness > 4cms → Placentomegaly

↓

Causes

maternal
1. Diabetes
2. Severe anaemia
3. α- thalessemia

Fetal
1. Hydrops fetalis
2. Infections [syphilis, TORCH]
3. Triploidy

Anomalies of placenta

00:34:06

I. Battledore placenta
- Normal placenta → Centre of placenta
- Battledore placenta → Cord attached to margin of placenta
  (or)
  Marginal insertion of cord

Active space

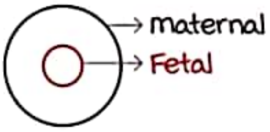
2. Extrachorial placenta

Normally, Fetal side = maternal side of placenta
↓ (chorionic plate) ↓ (Decidual plate)

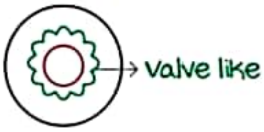
Extrachorial placenta → Fetal side < maternal side
[Fetal side is surrounded by maternal side in the form of a ring]

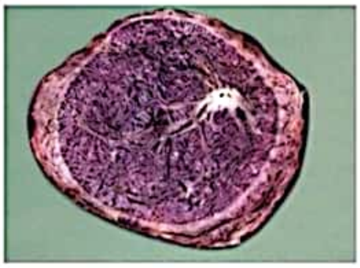
a. Types

Circummarginate
Fetal side is surrounded by maternal side smoothly

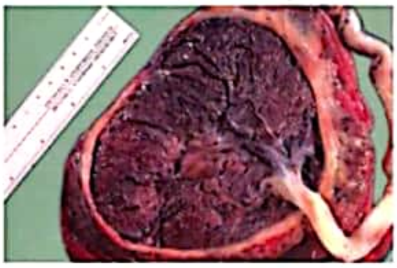


Circumvallate
Fetal side is surrounded by maternal side with a valve-like thickening in between





maternal > fetal side



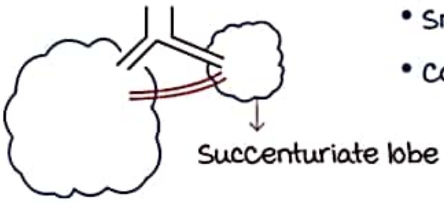
Fetal side is depressed, thickened than maternal side, valve like ⊕

b. Complications

IUGR [Intrauterine Growth Retardation], APH [Antepartum Hemorrhage]

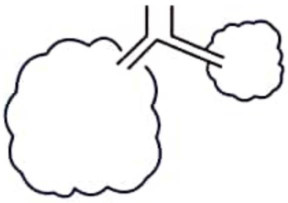
Other anomalies of placenta 00:45:00

1. Succenturiata placenta



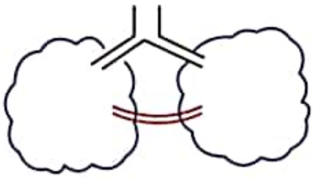
- Small part detaches from main part
- Connecting blood vessels ⊕

2. Placenta spuria



- Small part detaches from main part
- No connecting blood vessels

3. Placenta Bilobata



- 2 equal parts of placenta separated from each other
- Connecting blood vessels ⊕

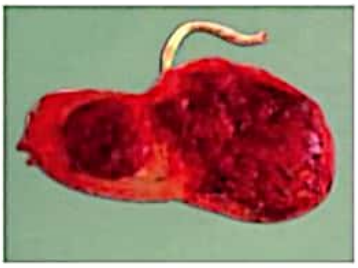
- Also known as placenta bipartite / duplex

Complications of the above anomalies

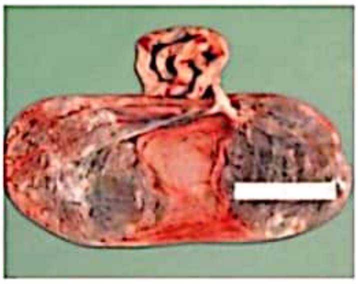
2° PPH [>24 hrs - <12 weeks after delivery]

Management of the above anomalies

Curettage → But, incase of postpartum women curettage is the most common Cause of Asherman syndrome
↓
(Intrauterine Adhesions)

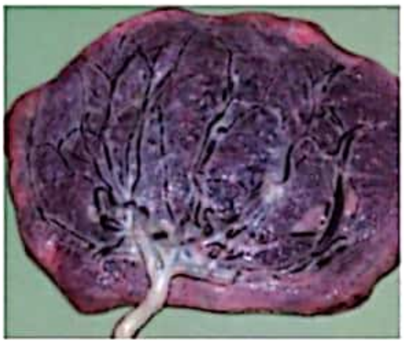


→ Placenta succenturiata



→ Placenta Bilobata

Normal placenta



Battledore placenta

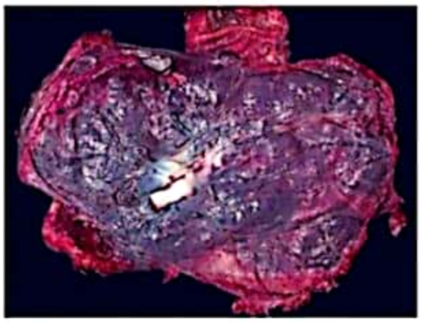
Fenestrated placenta, placenta membranacea 00:54:43

1. Fenestrated placenta

- Central portion of a discoidal placenta is missing
  i.e. missing chorionic plate and villi

2. Placenta membranacea

- All of the fetal membranes are covered by functioning villi.
- Placenta develops as a thin membranous structure.
- Occupies the entire periphery of the chorion.
- Serious hemorrhage due to associated placenta Previa / Accreta

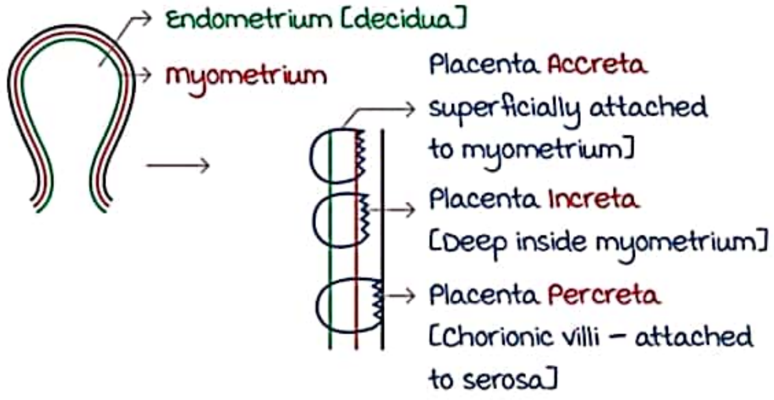


Morbidly adherent placenta 00:57:23

- Nitabuch's layer
  - Layer of fibrinoid degeneration which is present between placenta and decidua
  - Limits the penetration of blastocyst
  - Absent Nitabuch's layer → morbidly adherent placenta

Morbidly Adherent Placenta

- Types


Endometrium [decidua]
Myometrium
Placenta Accreta
superficially attached
to myometrium]
Placenta Increta
[Deep inside myometrium]
Placenta Percreta
[Chorionic villi – attached
to serosa]

Pathogenesis:

1. Absent Nitabuch's layer
2. Absent Decidua Basalis

Risk factors

1. Placenta previa in present pregnancy [1st highest risk factor]
2. Previous history of cesarean section [2nd highest]
3. Others: History of uterine curettage
   History of uterine surgery – myomectomy,
   Hysterotomy

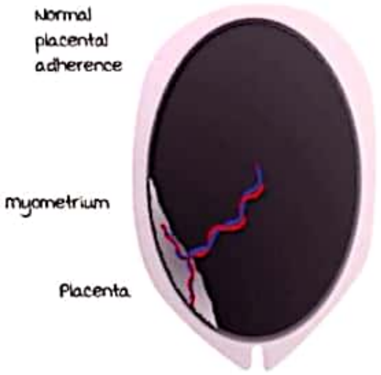
Clinical Presentation

1. Undiagnosed case → Presents as a case of refractory PPH

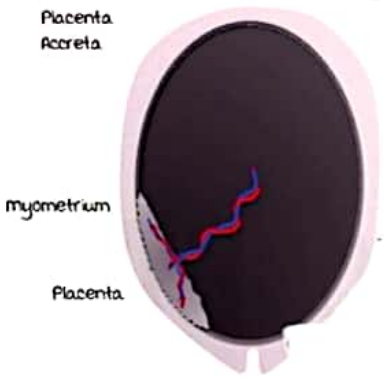
Morbidly adherent placenta – management 01:08:22

1. Diagnosis

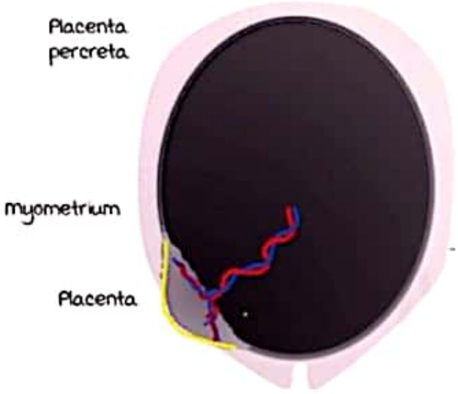
- IOC in antenatal period → USG (Trans Vaginal Ultrasound)
  - USG shows → i) subplacental sonolucent area which represents Decidua basalis – Absent


Normal placental adherence
myometrium
Placenta

Normal


Placenta Accreta
myometrium
Placenta

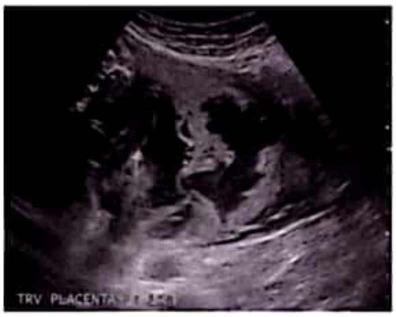
Placenta accreta – Absent subplacental sonolucent line


Placenta percreta
myometrium
Placenta

Placenta percreta

ii) Heterogenous appearance of placenta

iii) Placental lakes are present


TRV PLACENTA

Placenta lakes

- Gold standard → MRI

a. management

Elective Caesarean/section + Hysterectomy

(Classical Caesarean-section)

↓

Reason: Placenta Accreta is common in placenta previa

∴ To prevent excessive bleed

↓ if woman refuses

Leave the placenta which cannot be removed → Autolysis

+

methotrexate

[To prevent Gestational Trophoblastic Neoplasia]

PLACENTA – 2

Hormones produced by placenta – Progesterone

00:00:05

Hormones produced by placenta

- Progesterone
- Estrogen
- hcG
- Human Placental Lactogen (hPL)

I. Progesterone

- 2 main sources of progesterone
  - Early weeks of pregnancy → Corpus luteum [7–9 weeks] or 8 weeks
  - > 8 weeks → Placenta

Luteal placental shift – Functional shift from corpus luteum to placenta

- Life span of corpus luteum – 10 to 12 weeks
- Precursor of progesterone – maternal LDL & cholesterol
- Rate of production of progesterone – 250 mg/day
  Incase of twin pregnancy – ≥ 600 mg/day
- 2 reactions in pregnancy

Decidual Reaction

i) Glands become hypersecretory
+
Stroma becomes edematous & rich in glycogen

Arias stella reaction

i) Glands → Hypersecretory
+
Changes in nuclei

ii) Seen in
- Intrauterine pregnancy
- Ectopic pregnancy
- molar pregnancy

- Progesterone relaxes smooth muscles in pregnancy

Estrogen 00:04:28

- Placenta cannot synthesize estrogen using precursors from the mother [Reason: Lack of 17-α hydroxylase enzyme]

  ∴ No conversion of

  17 OH Progesterone [C_{21} steroid] → Androstenedione [C_{19} steroid]
  ↓
  Required for estrogen synthesis

- Fetal Adrenal Glands
  ↓ ← Fetal ACTH
  DHEA-sulphate [C_{19} steroid] $\xrightarrow[\text{Sulphatase, Aromatase}]{\text{By placenta}}$ Estrogen

- most common estrogen during pregnancy → Estradiol [E_2]
- most specific estrogen during pregnancy → Estriol [E_3]

- Role of estrogen
  - At term: Uterine contraction

↑ Estrogen	↓ Estrogen
↑ placental tissue - Seen in Erythroblastosis fetalis, Rh incompatibility	i) Absent / Hypoplastic adrenal glands in the fetus - Seen in Anencephaly ii) Deficiency of placental sulfatase, Aromatase iii) Fetal demise iv) Down's syndrome - ↓ overall production of c19 steroid in fetus

Human Chorionic Gonadotropin (hCG) 00:13:01

- main site for hormone production → Syncitiotrophoblast
- Glycoprotein hormone
  - Hormone with: maximum glycogen content
- 2 subunits → α and β

- α subunits
  - i) Non – specific
  - ii) Similar in LH, FSH & TSH
  - iii) Gene → Chromosome 6

- β subunit
  - i) Specific [∴ β sub unit is measured for pregnancy]
  - ii) Gene → chromosome 19

- hCG
  - I) Anatomically similar to LH, FSH & TSH

    but
  - II) Functionally similar to LH only

- hCG detection in Blood:
  - 8 days after fertilization
  - Day 22 of cycle
  - 5-6 days before missed period

- most sensitive test to detect hCG → FIA > RIA

  [FIA: Fluorescent Immuno-Assay

  RIA: Radio Immuno – Assay]

Levels and functions of hCG

00:18:17

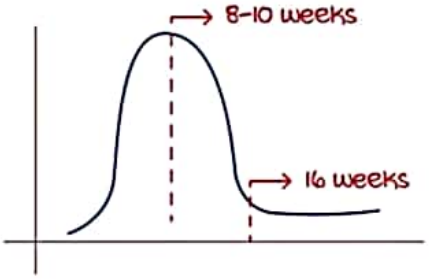
- Levels of hCG:
  - Increase every 48hrs in early pregnancy [nearly doubles]

    i.e about 55-65%
  - maximum hCG levels: 60-80 days (or) 10th week of pregnancy

    i.e hCG = $50{,}000 - 10^5$ IU/L
  - hCG starts to decrease after 10th week

    ↓

    minimum at 16 weeks of pregnancy



Active space

Low level of hCG is continued throughout pregnancy

- hCG level becomes normal:

i) After delivery → 1-2 weeks
ii) After abortion → 2-4 weeks
iii) After partial mole evacuation → 7 weeks
iv) After complete mole evacuation → 9 weeks

- T½ of hCG → 36 hours
  (T½ of LH → 2 hours)

- Functions of hCG:
  i) Helps to maintain corpus luteum of pregnancy
  ii) Initial stimulus for leydig cells to produce testosterone
  iii) Prevents rejection of fetus

Levels of hCG: ↑	↓
i) Twin pregnancy	i) Ectopic pregnancy
ii) molar pregnancy	ii) All trisomies except down's
iii) Choriocarcinoma	iii) Abortion
iv) Down's syndrome	
v) Erythroblastosis fetalis	

- Urine pregnancy test
  - Sandwich Elisa test
  - Sensitivity: detects hCG with 20 IU/L

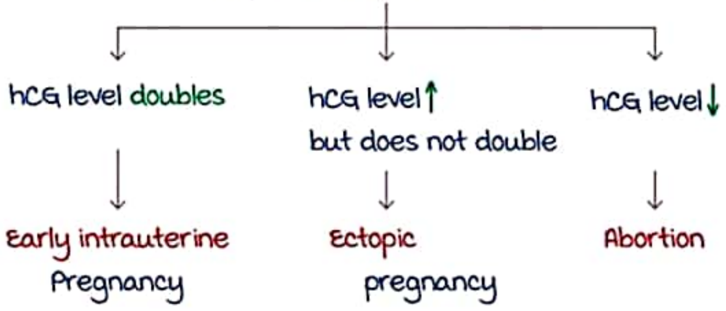
- Critical titre of hCG
  The value of hCG at which 100% cases of intrauterine pregnancy has a visible gestational sac
  - TVS: ≥ 1500 IU
  - TAS: 6500 IU [>5000 IU]

Cast scenario

1. UPT – Positive, hcg = 1000 IU, TVS = No gestational sac seen

↓

Repeat hCG after 48 hours


hCG level doubles
hCG level ↑ but does not double
hCG level ↓
Early intrauterine Pregnancy
Ectopic pregnancy
Abortion

2. UPT – positive, hCG = 2500 IU, TVS – gestational sac not visible

↓

Ectopic pregnancy

Human placental lactogen 00:31:56

- Also known as HCS [human chorionic somatotropin]
- Single chain polypeptide hormone
- hPL is similar to GH (growth hormone), PRL (prolactin hormone)
- Detected at 3 weeks of pregnancy
  - Continues to ↑ throughout pregnancy
  - Reaches maximum at 36 weeks
- Marker – To check placental functioning
- Hormone which is produced maximum at term → hPL (1g/dl)
- T½ – 20-30 mins
- Functions

i) Promotes lipolysis in mother

↓

↑ Fatty acids

↓

Used by mother for energy requirement

∴ Glucose is spared for fetus

iii) HPL brings about insulin resistance

↓

↑ Glucose level

Active space

Hormones which bring about insulin resistance:

HPL (mainly)
Estrogen
Progesterone
Cortisol

Fetal membranes 00:36:35

1. Chorion
   - Formed 8 days after fertilization
   - By cytotrophoblast (chorion levae)
   - Outer layer

2. Amnion
   - Formed 10 days after fertilization
   - Inner most membrane
   - Avascular
   - maximum tensile strength

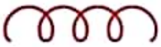
3. Yolk sac
   - Site for hematopoiesis in fetus

4. Allantois
   - Diverticulum derived from hindgut and grows in the connecting stalk

Note

PGE_2 – is the prostaglandin which is predominant in fetal membranes

Umbilical cord 00:38:15

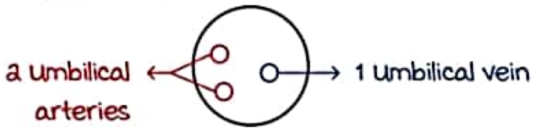
- Derived from connecting stalk
- Average length – 55 cms
- Range – 30-100 cms
- Short cord – <30 cms
- PH – 7.2
- Connective tissue of the cord – wharton's Jelly
-  – Folds of Hobokon
- Early intrauterine life – 4 vessels present

  Right and left umbilical artery
  Right and left umbilical vein

- Later

    Right umbilical vein – Disappears

- At the time of birth



- Most common vascular anomaly of a cord → Single umbilical artery
- Single umbilical artery
    - More common in diabetic, twin pregnancy
    - Not an insignificant finding
    - ↑ chances of malformation {CVS + Renal}
    - Malformation + single umbilical artery

      ↓

      Trisomy in fetus

- Velamentous insertion of cord
    - Cord 1st attaches to fetal membranes and then to placenta and before attaching to placenta, it divides
    - In such case, whenever membranes rupture

      ↓

      Cord gets damaged (umbilical artery and vein also gets damaged)

      ↓

      Fetal blood loss

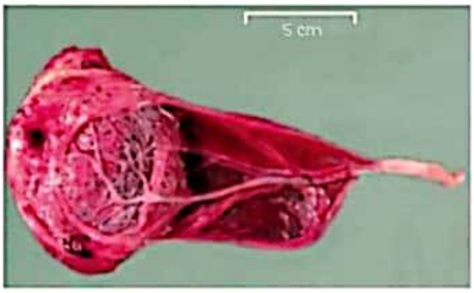
      ↓

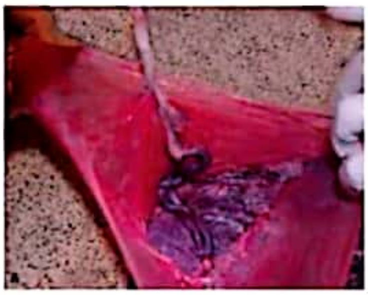
      Vasa previa ⇒ ↑ perinatal mortality

    - Since fetal blood exits through mother's vagina

      ↓

      Often confused with placenta previa





Active space

Singer alkali denaturation test

00:47:10

i) Fetal blood → HbF – Resistant to Alkali and acid

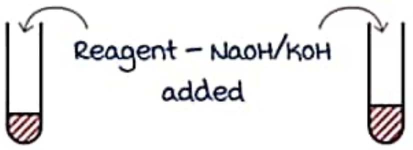
- Seen in vasaprevia

ii) maternal blood → HbA – Sensitive to acid and alkali

- Seen in placenta previa

Test done:

- Singer alkali denaturation test / APT test: done if woman presents with bleed per vagina(PV)



↓	↓
Colour – remains same	Colour – becomes brown
↓	↓
Blood resistant to alkali	Hemolysis occurred
↓	↓
HbF	HbA
↓	↓
Vasaprevia	Placenta previa

- To diagnose antenatally [no bleed PV]: Doppler USG

Management of vasa previa

- Cesarean section

Prognosis of vasa previa

- ↑ perinatal mortality

AMNIOTIC FLUID AND ITS DISORDERS

Amniotic Fluid:

- Specific gravity : 1.008 – 1.010
- Osmolality : 250 mosm/L
- pH : 7.2– 7.4 (Alkaline)
- Rate of turnover of Amniotic fluid: 500 ml/hr
- In Premature rupture of membranes, pH of amniotic fluid helps to differentiate it from acidic pH of vaginal discharge.
- Nitrazine paper test

1. amniotic fluid (PROM)–nitrazine paper turns blue (due to alkaline pH)

2. vaginal fluid–nitrazine paper remains yellow (due to acidic pH)

Volume of Amniotic fluid:

- At 12 weeks – 50 ml
- At 16 weeks – 250 ml
- At 20 weeks – 400 ml
- At 32 weeks – 1 litre – maximum at 32 weeks
- At 36 weeks – 900 ml
- At 40 weeks – 800 ml – At term
- At 42 weeks – 200 ml – Post term
- max. value of amniotic fluid – 32 > 34 wks
- As pregnancy advances – volume of amniotic fluid decreases.

major contributors of Amniotic fluid :

Period of gestation	major contributor
• Early weeks (1st trimester)	maternal plasma
• 12 – 20 weeks	Fetal skin (Transudate)
• ≥ 20 weeks	Fetal urine

major contributor overall – Fetal Urine

- Urine production begins in the fetus at 12 weeks
- Keratinisation of fetal skin at 22 – 25 weeks of pregnancy
- Normally Amniotic fluid is colourless but at term it is straw colored

Colour of amniotic fluid	Conditions
1. Green coloured (meconium)	• Fetal Distress
	• Breech presentation / Transverse lie
	• Listeria infection
2. Golden colour (Bilirubin)	• Rh incompatibility
3. Tobacco juice colour	• Intrauterine death
4. Saffron coloured, yellowish green	• Post dated pregnancy
5. Dark coloured	• Abruptio placenta

- Amnotic fluid is kept in balance by fetus(swallowing)
- Composition of amniotic fluid : 99% water
- No Nutritive function

Measurement of amniotic fluid

00:11:54

- Best investigation: USG

Divide abdomen into 4 quadrants

↓

measure the largest vertical pocket in each quadrant(in cms)

↓

Add a + b + c + d = AFI (Amniotic Fluid Index)

- Normal AFI = 5 –24 cms
- If ≤ 5 cm = Oligohydramnios
- If ≥ 25 cm = Polyhydramnios
- most Sensitive indicator of measurement : Single largest vertical pocket (overall)

↓

Normal : 2 – 8 cms
< 2cms : Oligohydromnios
≥ 8 cms : Polyhydromnios

- Normal volume of : 200ml – 2 liters
  < 200ml – Oligohydramnios
  ≥ 2 liters – Polyhydramnios

Oligo and polyhydramnios

00:17:48

Oligohydramnios	Polyhydramnios
• mcc of mild oligohydramnios: Idiopathic	• mcc of mild polyhydramnios: Idiopathic
• mcc of severe oligohydramnios Congenital malformation ↓ Renal Anomalies	• mcc of severe polyhydramnios Congenital malformation ↓ malformations >> NTD-neural tube defects

Oligohydramnios-other causes

D - Drugs: Indomethacin, ACEinhibitors

I - Intrauterine growth retardation (IUGR) (Brain Sparing effect)

L - Leaking following Amniocentesis

M - maternal PIH

↓ blood flow to fetus

↓

↓ fetal renal blood flow

↓ GFR

↓

oligohydramnios

P - Premature rupture of membranes

P - Post term pregnancy

A - Amnion nodosum*, Chromosomal abnormalities - Triploidy, Trisomy 13*

R - Renal anomalies

1. multifetal pregnancy

2. maternal diabetes mellitus

↓

Fetal Hyperglycemia

↓

Polyuria → Polyhydramnios

3. High fetal cardiac output:
   - a) Fetal Anemia
     - Rh incompatibility
     - Parvo virus infection
     - Hemolysis
   - b) α - Thalassemia
   - c) Fetal Bartter syndrome

4. Swallowing Defect :
   - a) Esophageal atresia
   - b) Duodenal atresia
   - c) Intestinal obstruction
   - d) Cleft lip , cleft palate
   - e) Trisomy 21 - mc trisomy
   - f) Trisomy 18 - IUGR + Polyhydramnios

Active space

5. When C.S.F leaks into amniotic fluid :
6. Chorangioma of placenta
7. TORCH infections

Effect of oligo & polyhydramnios on pregnancy 00:35:07

1. Oligohydramnios

↓

Less space

↓

Fetal parts grow properly

mc problem: Pulmonary Hypoplasia

2. Amniotic band sequence :

↓

Less Amniotic fluid

↓

Amnion wraps around some body Structure like a band Devascularisation of that part

mc problem: Limb Amputation followed by Craniofacial Defects

If oligohydramnios occurs in late pregnancy :

↓

Organogenesis complete

↓

But less space

↓

Cord gets compressed

↓

Blood supply Decreases

Polyhydramnios

1. membranes get stretched

↓

- Preterm labour
- PROM

2. mother experiences Respiratory distress
3. Abruptio Placenta
4. Cord prolapse
5. malpresentation
6. Amniotic fluid embolism.
7. PPH.

↓

Fetal Distress → meconium in amniotifluid

↓

Meconium Aspiration syndrome

2. Congenital talipes equinovarus(CTEV) - Compression defect

- Time for Delivery in Idiopathic Oligohydramnios - 37 - 38 wks + 6 days

Management of oligohydramnios:

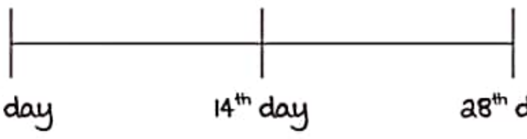
1. Amino infusion with normal saline.

1. Serial Amniocentesis: Only in pregnant females with excessive respiratory discomfort
2. Drugs that can be used to manage polyhydramnios → Indomethacin (C/I beyond 32 weeks of pregnancy)
3. After 32 weeks, the chances of closure of ductus arteriosus is increased by 50%, whereas below 32 weeks the risk is less and reversible.

Active space

FETUS – 1

- Gestational age = Fetal age = Period of Pregnancy



- 1st day Day of last menstrual period ↓ • Ovulation/ fertilisation ↓ • missed period
- Calculate Pregnancy   Definition of Growth period
- On the day of missed period – pt .is 4 weeks pregnant
- Fertilisation happened 2 weeks back from the missed period
- An event – Happens from x days from day of fertilization. That Event will happen x days + 2 weeks of pregnancy
- Eg: 1. Trophoblast divides into cyto and Syncytiotrophoblast 8days after fertilisation.

    Gestational age – 2 weeks + 8 days

    2. Cardiac activity of fetus seen at 5weeks of pregnancy. ie, 3weeks after fertilisation

Fetal growth periods

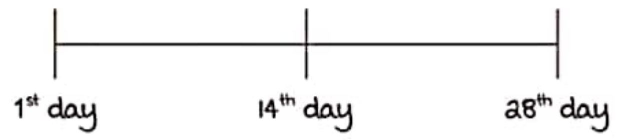
00:09:18

- Defined from the day of fertilization and not from the 1st day of LMP

Growth Period	Normal Definition (From Day of Fertilization)	Definition as per period of Pregnancy (+2weeks)
1. Fertilised Ova	From Day of fertilization upto 2weeks of pregnancy	Uptill 4weeks of pregnancy

FETUS – 1

- Gestational age = Fetal age = Period of Pregnancy



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- Ovulation/ fertilisation ↓
- missed period

- Calculate Pregnancy

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Growth Period	Normal Definition (From Day of Fertilization)	Definition as per period of Pregnancy (+2weeks)
1. Fertilised Ova	From Day of fertilization upto 2weeks of pregnancy	uptill 4weeks of pregnancy

2. Embryonic Period	From 3wks after fertilisation and upto 8weeks after fertilisation	From 5weeks → 10weeks of pregnancy
most terato-genic period is Embryonic period.		
3. Fetal period	≥9wks after fertilisation & upto delivery	11 weeks of pregnancy and upto delivery

The total duration of pregnancy = 280 days / 40wks / 9months + 7 days

Trimesters

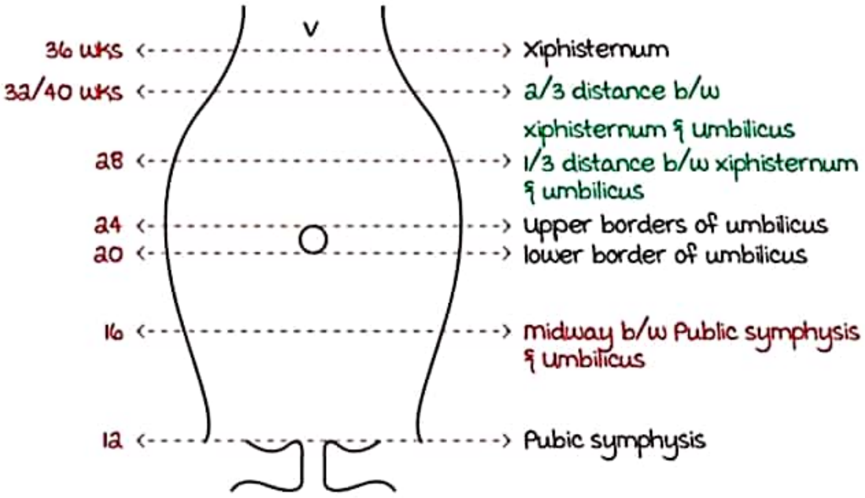
1st trimester
uptill 13 weeks + 6 days

2nd trimester
14 weeks ↓ 27 weeks + 6 days

3rd trimester
28 weeks ↓ 40 weeks

Estimation of fetal age 00:16:50

- Clinically by assessing the Fundal height


36 wks ← → Xiphisternum
32/40 wks ← → 2/3 distance b/w xiphisternum & umbilicus
28 ← → 1/3 distance b/w xiphisternum & umbilicus
24 ← → upper borders of umbilicus
20 ← → lower border of umbilicus
16 ← → midway b/w Public symphysis & umbilicus
12 ← → Pubic symphysis

- mother experience a lot of respiratory discomfort at 36 weeks.
- After 36 wks → Head of the fetus goes down into pelvis
  ↓
  Height of the uterus decreases

- At 40 weeks, the height of the uterus corresponds to 32 weeks pregnant uterus height → Respiratory discomfort ↓
  This is known as lightening/welcome sign

USG Estimation of fetal age:

- Best method

Trimester	Best Parameter
1st trimester	Crown rump length
2nd trimester	biparietal Diameter > head circumference
3rd trimester	Femoral length

- The earlier the USG is done in pregnancy, the more accurately it predicts the fetal age
- Suboptimally dated on USG: If a female has not got any USG done before 22 weeks of pregnancy
- EDD Should not be changed based on USG except in cases of IVF

Crown – Rump length 00:28:25

- It is the measurement taken from the vertex of the fetus to the coccyx
- CRL + 6.5 mm = Gestational age in weeks.
- CRL + 42 = Gestational age in Days
- CRL increases by 1 mm/day
- Smallest CRL at which embryo is visible 4–5 mm
- If CRL ≥ 7 mm + No cardiac activity → missed abortion

Biparietal diameter 00:30:43

- measured from the outer table of one side to the inner table of the fetal skull on the other side

Hasse rule:

- <5months of Pregnancy → $\sqrt{\text{Fetal length}}$ → Gestational age
- >5 months → $\frac{\text{Fetal length}}{5}$ → Gestational age
- <5 m → Fetal length → Vertex to coccyx → CRL
- >5 m → Fetal length → Vertex to Heels → Crown Heel length

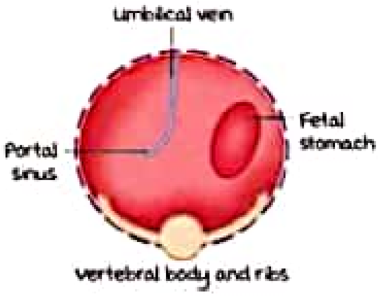
Assessment of weight of fetus

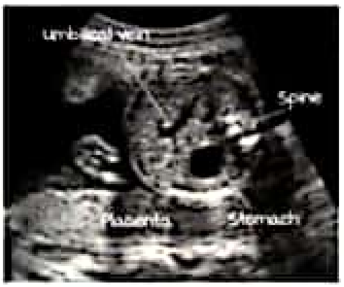
00:35:13

- clinically – Johnson formula
- USG – Shepherd formula
  Hadlock formula

Assessment of fetal growth:

- USG
  - Abdominal Circumference of fetus:
  - Abd. circumference should be measured in a plane where P, U, S are visible
    P – Portal Sinus
    U – Umblical vein
    S – Stomach


Umbilical vein
Portal sinus
Fetal stomach
vertebral body and ribs


umbilical vein
Spine
Placenta
Stomach

- Abdominal circumference is the Only parameter which tells us about the growth of fetus. It can be IUGR or macrosomia
- If Ac ≥35 cms – macrosomia
- Normally $\frac{\text{Femoral length}}{\text{Abdominal circumference}}$ = 20–40%

Ratio increased → IUGR

Decreased → Skeletal dysplasia

Fetal hematopoiesis

00:41:08

Site	Time of Pregnancy	Main Hb formed
1. Yolk sac	Uptill 6 wks of pregnancy	Grower 1 Grower 2 Portland Hb
2. liver	upto 20 weeks	HbF
3. Bone marrow	After 20 weeks	HbA

Fetal Erythrocytes:

1. Early Intrauterine life: Fetal RBC's

- Nucleated and macrocytic (MCV= 180 fl)

↓

Later the size decreases to 105 fl; But this does not happen in Aneuploid fetuses

2. Difference between adult & fetal RBC:

- Fetal RBC's are large in size and short life span (90 days)

- At the time of birth, the Hb of the baby → 16-18 g/dl
  - ↓ 75-80% HbF
  - ↓ 20-25% HbA

- But by 6 months of age HbF will be <1%

HbF	HbA
1. Less OF 2, 3 DPG	1. more 2, 3 DPG
2. Less carbonic anhydrase (CA)	2. more CA
3. Higher affinity for O2	3. Less affinity for O_2
4. Resistance to acid & alkali	4. Sensitive to acid and alkali

↓ forms basis to two tests

1. Apt test/Singers alkali denaturation test
2. Kleihauer Betke test

Active space

Apt test	Kleihauer betke test
1. Helps to differentiate between placenta previa and vasaprevia	1. Help to calculate the dose of Anti-D in Rh – ve females
2. Reagent: 1% NaOH (or) KOH	2. Reagent: Citric acid phosphate buffer
3. Qualitative test	3. Quantitative
4. Differentiating b/w fetal and maternal blood	4. Differentiate b/w fetal R.B.C and maternal R.B.C

Major events in fetal development

00:53:10

Event	Seen at
1. Fetal gross body movements	7 weeks
2. Gonads formation (Testis>ovaries)	7 weeks
3. Glucagon synthesis	8 weeks
4. Internal genitalia(m or F)	10 weeks
5. Breathing movements	11 weeks
6. External genitalia	
Female	12 weeks
male	14 weeks
7. Insulin production	12 weeks
8. HP axis	
9. Fetal urine	
10. meconium production	16 weeks / 4 months

Fetus produce only IgM, begins at 20 weeks
IgM and albumin cannot cross placenta
IgG transported to fetus at 16 weeks

- Surfactant production begins at 20 weeks, present in amniotic fluid by 28 weeks

FETUS – 2

- USG during pregnancy
  - Help to confirm pregnancy
  - To differentiate intrauterine, ectopic pregnancy and twin pregnancy
- USG – High frequency – Better Resolution
  Low frequency – Better Penetration
- Early Pregnancy : Frequency – 5-10 MHz
- Late 1st and 2nd trimester: 4-6 MHz
- 3rd trimester: 2-5 MHz
- Alara principle: Expose the pregnant female to USG as low as reasonably advised
- Routine USG : B mode
- To see cardiac activity : M mode

Sign	TVS	TAS
1. Gestational Sac	4 weeks + 1 day to 4 wks +3 days	5 weeks
2. Yolk sac	5 weeks	5.5 weeks
3. Cardiac activity	5-6 weeks	6-7 weeks

Intrauterine Pregnancy	Ectopic pregnancy
1. True sac is seen	1. Pseudogestational sac is seen
2. True sac is located eccentrically	2. Centrally located.
3. True sac increases in size every day	3. Pseudo sac do not grow
4. Double decidual sac sign +ve	4. –ve

1st sign of Pregnancy on USG: Gestational sac

1st sign of Intrauterine pregnancy on USG: Yolk sac

- mean sac diameter ≥25 mm & No fetal tissue / Yolk sac / No cardiac activity

↓

Blighted ovum

- If CRL ≥ 7 mm + No cardiac activity : missed abortion
- USG helps in detecting congenital malformations

Congenital malformations and USG

00:19:10

USG in pregnancy

↓ Routine USG → Type I USG
- Can detect only few congenital malformations
- Anencephaly can be detected

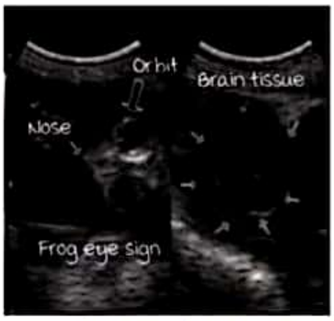
↓ Type 2 USG / TIFFA (Targetted Imaging for Fetal Anomalies)

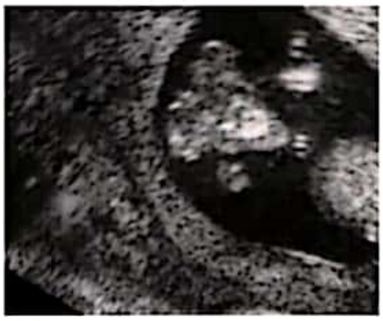
↓
- Can detect all congenital malformations

↓
- Done in all pregnant females
- Best time : 16-20 weeks

Anencephaly and USG:

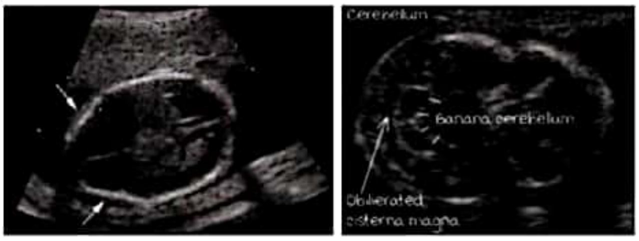
- Earliest time to be detected on USG : 10 weeks
- Best time to be detected on USG : 14 weeks
- Signs of anencephaly on USG : Frog eye sign
  mickey mouse sign





- Signs of Spina bifida on USG:
  - Small BPD
  - Ventriculomegaly
  - Frontal bone scalloping – Lemon sign
  - Elongation and downward displacement of cerebellum – Banana sign

Active space


Cerebellum
Banana cerebelum
Obliterated cisterna magna

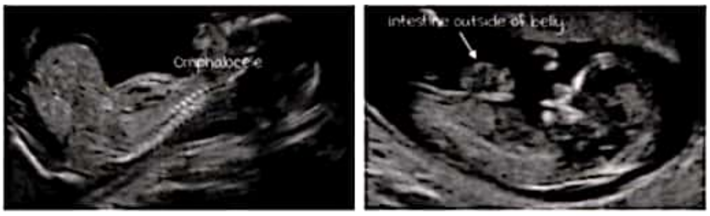
- Size of ventral defect: ≥ 7 mm

↓

Pathological

↓ Omphalocele ↓ Gastroschisis

- The defect in omphalocele and gastroschisis continues after 12 weeks of pregnancy
- Omphalocele ↓ Gastroschisis ↓
- As covered by sac, defect will have Smooth contour
- Defect will have Irregular contour


Omphalocele
intestine outside of belly

- Best time for USG to localise the placenta – 3rd trimester

Other important points about Anencephaly:

- Vault or Skull – Absent
- Adrenal glands – Absent or Hypoplastic

↓

↓ DHEA

↓

↓ Estrogen production by placenta

↓

Post term Pregnancy

- Polyhydramnios → Increased chances of Preterm labour
- mc presentation in Anencephaly : face

Active space

- Chances of Recurrence
  - After 1 neural tube defects (NTD) : 4%
  - After 2 NTD's : 10%

- Anencephaly is more common in Female fetuses
- Macrosomia, Respiratory Distress – mc in male fetuses

Prevention of NTD's:

- Folic acid Supplementation

Management of Anencephaly: medical termination of pregnancy

Folic acid supplementation in pregnancy 00:37:45

- Prevents NTD's
- Prevents megaloblastic anemia
- Prevents IUGR
- Prevents Abruptio Placenta
- Dose of folic acid in pregnancy:

400 mcg/day	1 mg/day	4 mg/day [Therapeutic dose]
1. Given to all pregnant females with no history of NTD (Prophylactic Dose)	1. Pregnant female with megaloblastic anemia	1. Pregnant female with h/o NTD baby
2. All pregnant females with Diabetes	2. If pregnant female has 2° relative with h/o NTD	2. Pregnant female on antiepileptic drug which increases the chance of NTD Eg: Valproate
3. All pregnant on antiepileptics which do not cause NTD's (Eg: lamotrigine)	3. Pregnant female on any drug which decreases the folic acid absorption (Eg: Trimethoprim, sulfasalazine)	3. If pregnant female has sickle cell anemia

- Prophylactic dose of folic acid – 400 mcg

↓

Prevent NTD

↓

Ideally should be given 3 months before pregnancy
(atleast be given 1 month before pregnancy, should be continued till 3 months after pregnancy)

- Tablet provided by Govt.of India – 500 mcg
- RDA of folic acid in pregnant female – 500 mcg
- Pregnant female with h/o NTD in previous pregnancy

↓

4 mg/day (Therapeutic dose)

↓

Atleast given 1 month before pregnancy and continue 3 months after pregnancy

↓

After 3months, 400 mcg/day given throughout pregnancy

Diagnosis of Anencephaly:

Anencephalu

↓ Screening test

↓
- maternal serum AFP
- Routinely done at 15-20 weeks
- Best done at 16-18 weeks
- most Sensitive Biochemical marker

↓ Diagnostic test

↓
- Earlier: Amniocentesis (invasive)
- Now: Level 2 scan

Alpha feto protein 00:55:05

- Early weeks – Synthesised by fetal yolk sac
- Later – by fetal G.I.T & liver
- major source – Fetal liver
- AFP is present in
  - Fetal serum : Highest at 13 weeks
  - Amniotic fluid : Highest at 13 weeks
  - maternal serum : Highest at 32 weeks

- t½ - 5-7 days
- Screening test: maternal Serum AFP
  (≥ 2.5 multiples of meridian (mom) → +ve
  In twin pregnancy - ≥ 3.5 mom → +ve

↑ AFP	↓ AFP
1. NTD	1. Diabetic
2. Abdominal wall Defect	2. G – Gestational trophoblastic diseases
3. Pilonidal sinus	3. O – maternal obesity, overestimated GA
	4. A – Abortion
	5. T – Trisomy

MATERNAL ADAPTATIONS IN PREGNANCY : GENERAL METABOLIC CHANGES

Weight gain in pregnancy

00:00:05

- Weight gained in pregnancy 10 – 12 kg (12.5 kg)
- Net weight gained 5–6 kg
- Factors influencing weight gain
    1. Ethnicity
    2. Socioeconomic status
    3. Parity
    4. Pre pregnancy weight
- Smoking doesn't affect weight gain during pregnancy
- Total amount of water retained in pregnancy 6.5 L
    - ↓ Edema in Pregnancy (physiological pitting)
    - ↓ ↓ Plasma osmolality (10 m osmol)
    - ↓ ↓ Conc. of Na^+, K^+ in pregnancy inspite of Na^+, K^+ retention
- Fetus is dependent on mother for
    - 1) Glucose ↓ ∴ Insulin resistance in mother
        - ↓ HPL
        - ↓ 24–28 wks of Pregnancy
    - 2) Calcium ↓ ↑ Ca absorption, ↑ Vit D requirement
    - 3) Thyroxine ↓ ∴ Dose should be ↑ by 30 –50% in pregnancy
- Pregnancy is a diabetogenic state
- Pregnancy = Fasting hypoglycemia + Post prandial hyperglycemia

Note: 1. Vit D requirements in
- 1. Adults - 2.5 mcg (100 IU)
- 2. Children - 5 mcg (200 IU)
- 3. Pregnancy - 10 mcg (400 IU)

2. ↑ Ca requirement in pregnancy
   RDA of Ca^+ = 1200mg

Fat metabolism in pregnancy

00:15:30

- Hyperlipidemia in pregnancy ⊕ - LDL ↑
  - VLDL ↑
  - Cholesterol ↑
  - HDL ↑
  - Lipoprotein ↑
  - Apolipoprotein ↑

Changes in genital tract during pregnancy

00:16:35

Uterus	Non pregnant female	Pregnant female
1. Weight	50 - 80 gm	1000 gm (Williams - 1100gm) - Hypertrophy (marked) - Hyperplasia (limited)
2. Length	7 - 5 cms	35 cms
3. Volume	5 - 10 ml	5L (upto 20L)
4. Shape	Pear shaped	Globular ↓ Spherical (by 12wks) ↓ Ovoid (abdominal)

- Due to rectosigmoid in left side, there is dextrorotation of uterus

Uterine contractility

- During second trimester: Braxton hicks Contraction ↓
  1. Sporadic
  2. Infrequent
  3. IUP = 5 - 25 mm Hg
  4. Near term → False labour pain due to ↑ in frequency

Uteroplacental blood flow

mid term = 450 ml/min

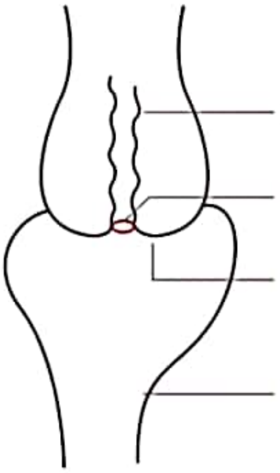
Term = 500-750 ml/min

Normal Pregnancy	PIH
1. Spiral artery : Vasodilation Angiogenesis ↓ Blood flow ∝ $(\text{radius})^4$ ↑ VEGF , ↑ PGF	No angiogenesis ↓ VEGF , ↓ PGF
2. Levels of VEGF & PGF are ↓ by receptor proteins S - FLt 1 (Soluble Fms like tyrosine Kinase 1)	↑ S - FLt 1
3. ↓ Peripheral vascular resistance → Progesterone → ↑ NO	↓ NO
4. Characterised by refractoriness to the pressure effects of Angiotensin II	-
5. micro RNA (mir 34 mir 17 - 92) Play important role in remodelling of spinal Arteries	-

- New predictors of PIH
  - ↓ VEGF
  - ↓ PGF
  - ↑ S - FLt 1
  - ↓ NO

Cervical changes in pregnancy

00:38:05


Endocervix → Lined by columnar epithelium
Red in colour
External OS
Ectocervix → lined by squamous epithelium
Pink in colour
Vagina

- Columnar epithelium of endocervix moves out & cover the squamous epithelium of exocervix → Eversion of cervix
  Ectropion

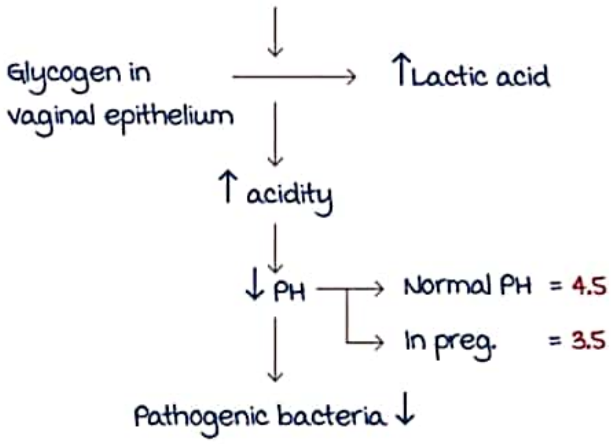
- During pregnancy, cervical canal is closed by a mucus plug
  ↓
  at the time of labor, when cervix dilates
  ↓
  Release of mucus plug + blood
  Show → Definitive sign of true labour

- Thick cervical mucus is due to progesterone
  ↓
  Beaded appearance on slide [If membranes have ruptured then amniotic fluid shows fern like pattern on slide]

Vaginal changes in pregnancy 00:46:18

1. Chadwick Sign – Bluish discolouration of vagina

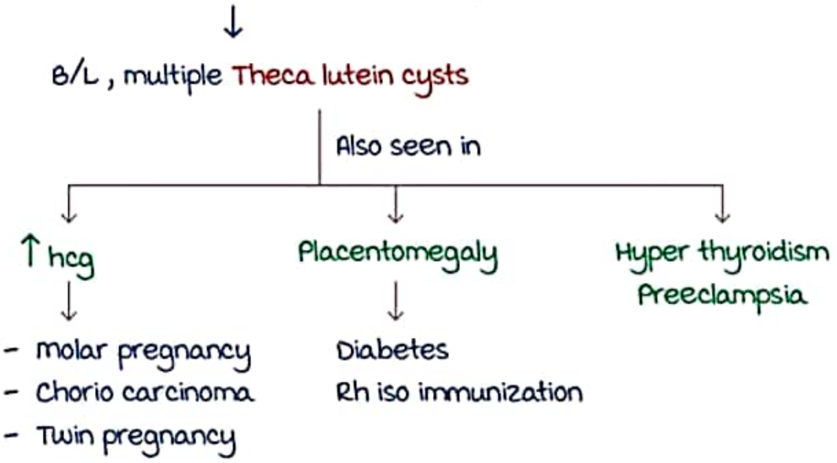
2. ↑ Doderlein's bacteria – Lactobacilli


Glycogen in vaginal epithelium
↑Lactic acid
↑ acidity
↓ PH
Normal PH = 4.5
In preg. = 3.5
Pathogenic bacteria ↓

- Candida can survive in acidic media ∴ most common vaginitis in pregnancy is Candidiasis

Ovarian changes in pregnancy 00:50:04

- Ovulation is suspended
- α Subunit of hCG is similar to LH & FSH


B/L , multiple Theca lutein cysts
Also seen in
↑ hcg
- molar pregnancy
- Chorio carcinoma
- Twin pregnancy
Placentomegaly
Diabetes
Rh iso immunization
Hyper thyroidism
Preeclampsia

Changes in breast in pregnancy 00:53:40

1. Montgomery tubercles
   - modified sebaceous glands

2. Colostrum Has everything more in comparison to breast milk except K – Potassium
   F – Fat
   C – Carbohydrate

- Extra caloric requirement in preg : + 350 Kcal/day
  Lactation : + 600 Kcal/day

- BMR ↑ by 10-20% in pregnancy

Active space

MATERNAL ADAPTATIONS TO PREGNANCY: HEMATOLOGICAL CHANGES

Hematological changes during pregnancy

00:00:14

Increased	Decreased
1. Blood volume → 40 - 45 % → maximum - mid trimester • Plasma volume increase in 40% • RBC volume increase in 20% • Number of : Erythrocytes ↑ reticulocytes ↑ • maternal erythropoietin levels ↑	1. Viscosity of blood ↓ - Hemodilution ↓ Physiological anemia → Hb not less than 11gm % • Packed cell volume ↓ ↓ $\frac{\text{RBC volume}}{\text{Plasma volume}}$ → Hematocrit ↓
2. Hemoglobin mass ↑ (gm) - Oxygen carrying capacity of blood ↑	2. Hemoglobin concentration decreases (g/dl)
3. Plasma protein increases (gm)	3. Plasma protein concentration decreases (g/dl)
4. Globulin increases Sex hormone binding globulin ↑ Thyroid binding globulin ↑ Normal A: G = 1.7 : 1 Pregnant A: G = 1:1	4. Albumin decreases

Active space

<table>
<tr><td>5. WBC increase
TLC = ↑ (15,000)
Postpartum → TLC = 25,000
DLC → Neutrophils ↑
T lymphocytes ↑
B lymphocytes → Normal
$CD_4 : CD_8$ → Normal</td><td>5. Platelet decreases but not less than normal.
K/A Benign gestational thrombocytopenia
monocytes ↓</td></tr>
<tr><td colspan="2">Pregnancy is an immunocompromised state</td></tr>
<tr><td>6. Humoral immunity Increases
T - Helper cell 2 ↑</td><td>6. Cell mediated immunity decreases
T - Helper cell 1 ↓</td></tr>
<tr><td colspan="2">T-H1 shift to T-H2 is not seen in pregnant women with PIH</td></tr>
<tr><td>7. Interleukin - 4 increases
Interleukin - 10 increases
Interleukin - 13 increases
Diseases mediated by TH-2 flare during pregnancy
Eg → SLE
8. All inflammatory markers ↑
ESR ↑
CRP ↑
All clotting factors ↑
Pregnancy is a Hypercoagulable State</td><td>7. Interleukin - 2 decreases
TNF decreases
Interferon α decreases
Diseases mediated by TH - I improve in pregnancy
Eg → Hashimoto's thyroiditis, multiple sclerosis, Rheumatoid arthritis
8. Factor II and 13 decreases
Factor 13 → fibrin stabilising factor</td></tr>
</table>

9. Serum fibrinogen level increases	9. Fibrinolytic activity ↓ Plasminogen $\xrightarrow{TPA}$ Plasmin TPA → Tissue plasminogen activator During pregnancy → TPA inhibitor increases Anticoagulants ↓ → Protein C ↓ → Protein S ↓

→ The size of spleen increases by 50%

Parameters which remains unchanged during pregnancy 00:23:28

1. B – lymphocyte
2. $CD_4 : CD_8$
3. Bleeding time and clotting time
4. Anti thrombin time

Changes in iron metabolism during pregnancy 00:24:24

→ All parameters of Iron metabolism ↓

→ During pregnancy → Total Iron ↓, S. ferritin ↓

Except : → Serum tranferrin levels
→ Total Iron Binding Capacity (TIBC)

→ Total Iron requirement during pregnancy = 1000mg

→ Fetal Iron requirement during pregnancy = 300mg

→ Daily requirement of Iron during pregnancy
= 4-6 mg/day

To fulfill in diet → 40 – 60 mg of Iron required

- Only 10% of diet iron is absorbed
- Iron supplementation is mandatory during pregnancy

Anaemia Mukt Bharat programe

- To prevent dimorphic anaemia

Gives → 60 mg of elemental iron
+
500 mcg of folic acid
↓

- 1 tab per day starting from 4th month of pregnancy
- Ideally continued throughout pregnancy but should be taken atleast for 180 days
- Should be taken for 180 days after delivery → To replenish iron stores
- Iron salt present → Ferrous sulphate
- mala D and mala N → Ferrous fumarate

Active space

MATERNAL ADAPTATIONS TO PREGNANCY: RESPIRATORY , GIT & RENAL CHANGES

Changes in GI system

00:00:18

- Gastric emptying time
  - → Normal in pregnancy
  - → ↑ during labour
- Progesterone – Smooth muscle relaxant
  - ↓ Relaxed lower Esophageal sphincter
    - ↓ ↑ GI Reflux
    - ↑ Heart burn (pyrosis)
  - ↓ ↑ Constipation
    - ↓ ↑ Haemorrhoids

Vomiting during pregnancy / morning sickness

- Due to hcg (main)
- Also due to Estrogen, Progesterone, Thyroxine, Prolactin, Placental GH, Leptins
- Resolves after 14 – 16 weeks of pregnancy
- Hyperemesis gravidarum

  Excessive vomiting + 1. Significant wt. loss
  2. Dehydration
  3. Alkalosis
  4. Hypokalemia
  5. Starvation Ketosis

Problems

- ↓ 1) Vit K deficiency
  - ↓ Prothrombin levels
  - Coagulopathy
  - Vit K embryopathy
  - Intracranial hemorrhage in fetus
- ↓ 1. Preterm labour
  2. Abruptio placenta
  3. Pre eclampsia

Active space

2. Thiamine deficiency

↓

Wernicke encephalopathy

Ataxia

Confusion

Ocular signs

Risk factors of Hyperemesis gravidarum

- ↑ hcg
  - molar pregnancy
  - Twin pregnancy
- Marijuana use
- Placentomegaly → Diabetes
- H. Pylori infection +/−
- Female fetus → ↑ Estrogen
- Hyperthyroidism

Management of vomiting in pregnancy

1. Mild / morning Sickness
   1. Small frequent meals
   2. Vit B6
   3. Doxylamine
   4. Doxylamine + Pyridoxine
   5. Diphenhydramine

2. Moderate Vomiting
   1. Promethazine
   2. Prochlorperazine
   3. Metoclopramide
   4. Ondensetron

3. Severe Vomiting : IV fluids + Thiamine

+

IV metoclopramide

Or

IV Promethazine

Or

IV Ondansetron

4. Intractable vomiting : Enteral / Parenteral nutrition

Respiratory changes in pregnancy

00:15:59

- Uterus pushes diaphragm up by 4 cm
  ↓
  - ↓ Residual volume
  - ↓ Expiratory reserve volume
- Transverse diameter of chest ↑ by 2 cm
  ↓
  - ↑ Tidal volume
  - ↑ minute ventilation
- Circumference of chest ↑ by 6 cm
- Subcostal angle ↑
  - → Non pregnant – 68°
  - → Pregnant – 103°

Functional residual capacity ↓ (ERV + RV)

Inspiratory capacity ↑ (IRV + TV)

Total lung capacity – Normal / Slightly ↓

Parameters which remain Normal in pregnancy

1. IRV
2. TLC
3. Respiratory rate
4. max. breathing capacity
5. Vital capacity

Renal changes in pregnancy

4:06

- Size of Kidney ↑ by 1 cm
- Hydroureter ⊕, mainly on Right Side
- Glycosuria is Ⓝ in pregnancy, Proteinuria (≥ 300mg/dl) → PIH
- Bladder
  1. Congestion of bladder
  2. Bladder pressure ↑ from 8 – 20cm of H_2O
  3. ↓ Bladder capacity
  4. Urethral pressure ↑
  5. Length of urethra ↑

Active space

- Total blood flow ↑ in pregnancy

↓

↑ Renal blood flow → ↑ GFR

↓ ↑ Clearance of urea, Uric acid, Creatinine

↓ ↓ S. Urea
↓ S. Uric acid
↓ S. Creatinine

MATERNAL ADAPTATIONS TO PREGNANCY : LIVER CHANGES

- Changes that occur in liver during pregnancy :
  1. Size of liver remains normal
  2. All liver enzymes decrease in pregnancy

Except : Serum Alkaline phosphatase – increases

↓

Synthesized by liver and placenta

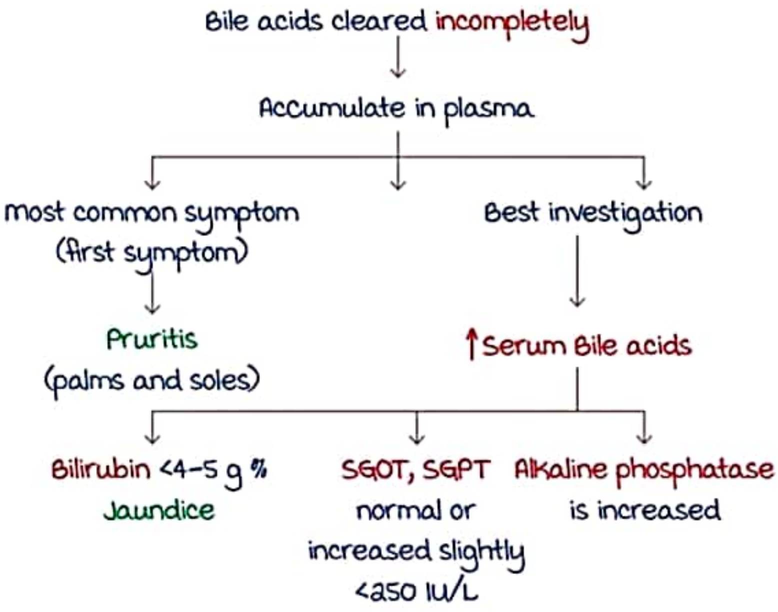
↓

Heat stable alkaline phosphatase

Cholestasis of pregnancy

00:01:47

- A/K/a recurring jaundice of pregnancy
  Icterus gravidarum
- Seen in III trimester
- Basic pathology :



Bile acids cleared incompletely

↓

Accumulate in plasma

Most common symptom (first symptom) ↓ Pruritis (palms and soles)

Best investigation ↓ ↑ Serum Bile acids

Bilirubin <4–5 g % Jaundice

SGOT, SGPT normal or increased slightly <250 IU/L

Alkaline phosphatase is increased

- Fetal complications
  - Preterm labour
  - Bile acid → ↓ surfactant → RDS : Respiratory distress syndrome
  - ↑ Fetal distress → meconium aspiration syndrome
  - Still birth

- Obstetric management
  - Induction of labour: 38–39 weeks of pregnancy
  - Termination of pregnancy: 38–39 weeks of pregnancy

- medical management
  1. Antihistamines for pruritus
  2. Cholestyramine not preferred – decreases absorption of vitamin K
  3. Drug of choice: Ursodeoxycholic acid

- Recurrence rate of cholestasis = 60–70%

  OC pills are contraindicated in these patients

Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Acute fatty liver of pregnancy

00:11:17

- most common cause of acute liver failure in pregnancy

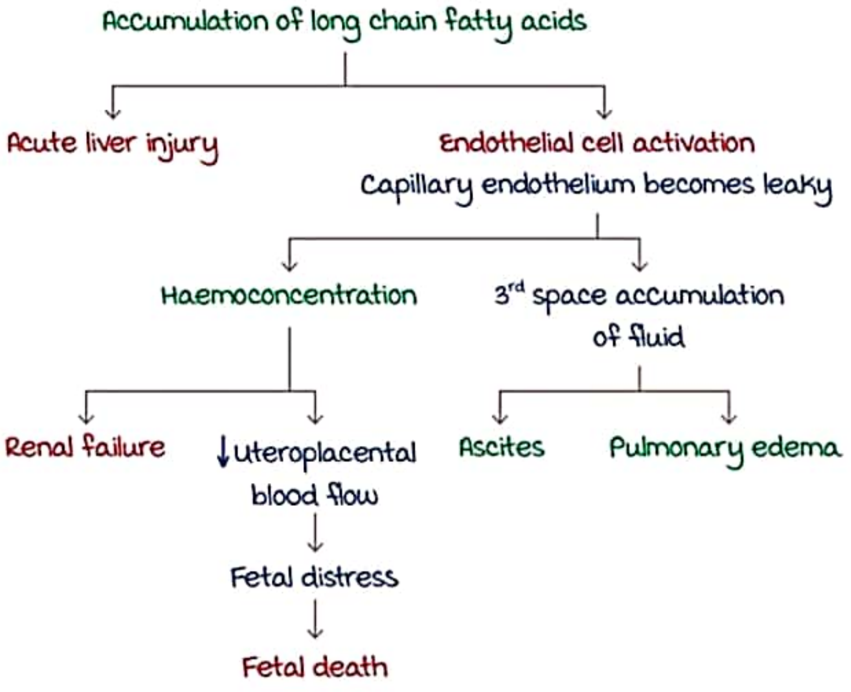
- Associated with recessively inherited mitochondrial abnormalities of fatty acid oxidation

  Abnormality = mutation of LCHAD gene on Chromosome 2

  ↓

  Long-chain L-3 hydroxyacyl CoA dehydrogenase (responsible for oxidation of long chain fatty acids)

- Pathophysiology :


Accumulation of long chain fatty acids
Acute liver injury
Endothelial cell activation
Capillary endothelium becomes leaky
Haemoconcentration
3rd space accumulation of fluid
Renal failure
↓ Uteroplacental blood flow
Ascites
Pulmonary edema
Fetal distress
Fetal death

- Clinical features
  - Nausea and vomiting in III trimester
  - 1 week later, Jaundice
  - In 50% cases → ↑ BP, proteinuria and edema

- Investigations:
  - ↑ Bilirubin (<10)
  - ↑ SGOT, ↑ SGPT (<1000)
  - ↑ Alkaline phosphatase
  - ↓ All clotting factors, Serum fibrinogen
  - ↑ Bleeding time, ↑ Clotting time, ↑ Prothrombin time
  - Hypoglycemia
  - Hypoalbuminemia

  - ↑ S. urea
  - ↑ S. uric acid
  - ↑ S. creatinine

- Differential diagnosis – HELLP syndrome

- management:
  - Immediate termination of pregnancy
  - mode of delivery → vaginal delivery if possible within 24 hours
    caesarean section otherwise
- Complications: seen in recovery phase
  Diabetes insipidus
  Pancreatitis

MATERNAL ADAPTATIONS TO PREGNANCY: ENDOCRINE SYSTEM CHANGES

Endocrine changes in pregnancy

00:00:19

Parameters ↑ during pregnancy	Parameters ↓ during pregnancy
1. Adrenal Gland All Hormones ↑ [including aldosterone] ⇓ ∴ Na^+ & K^+ retention	1. Adrenal Gland DHEA ↓ & DHEA-Sulphate ↓ [Dehydroepiandrosterone]
2. Pancreas Insulin secretion – ↑ Insulin resistance – ↑	
3. Pituitary Glands All Hormones released by Anterior Pituitary – ↑↑	Except - ↑ Progesterone → ↓ LH due to negative feedback on LH - ↑ Estrogen → ↓ FSH due to negative feedback on FSH by Estrogen

Changes in thyroid gland during pregnancy

00:02:51

Thyroid Gland

i) Size of thyroid → ↑ [But, Goitre is pathological]

ii) Level of hcg – ↑

- α – sub unit of hcg is similar to levels of TSH

⇓

↑ T_3, T_4 levels

iii) Thyroid Binding globulin – ↑

⇓

Levels of Free T_3, Free T_4 – Normal

⇓

∴ Euthyroid during Pregnancy

iv) TSH (Thyroid Stimulating Hormone) – Normal / Slight ↓

v) Iodine (I_2) requirement – ↑

[Reason – ↑ iodine excretion]

- RDA for Iodine during pregnancy = 250 mcg / day
  (RDA – Recommended Dietary Allowance)

vi) most common cause of Hypothyroidism during pregnancy

Developing countries ⇓ I_2 deficiency

Developed countries ⇓ Hashimoto Thyroiditis

vii) Dose of thyroxine should be ↑ by 30-50% during pregnancy

CNS changes during pregnancy

00:07:53

- Size of pituitary gland during pregnancy
  [especially anterior lobe]

  ⇓

  ↑ by 135%

- Sheehan's syndrome

  Post partum necrosis of anterior pituitary due to excessive blood loss [post partum Hemorrhage]

  1. Smoking is not related to weight gain in pregnancy
  2. BMI & weight gain

BMI [Kg/m^2]	Weight Gain [Kg]
i) Under weight [<18.5]	12.5 – 18
ii) Normal weight [18.5–24.9]	11.5–14
iii) Over weight [BMI ≥ 25]	7–11.5
iv) Obese [≥ 30]	<7

3. All clotting factors ↑ during pregnancy, except factor 11,14

4. Fluid retention in pregnancy → Blood viscosity ↓

   All iron parameters ↑

   Blood oxygen carrying capacity ↑

5. Uric acid level – ↓

6. most common cause of ↓ platelet ⇒ Benign gestational thrombocytopenia

7. Character of vagina
   - Doderlein bacilli ↑ [lacto bacilli ↑]

   ⇓

   ↑ conversion of Glycogen → Lactic acid

   ⇓

   Vaginal acidity – ↑

   ⇓

   pH ↓

   ⇓

   Pathogenic Organisms ↓

8. Globulin, Fibrinogen, Leukocytes, Transferrin – ↑

9. Acute fatty liver in Pregnancy – Bilirubin < 10 mg / dl

   Idiopathic cholestatic Jaundice – Bilirubin < 5 mg / dl

10. Bile acid – Best diagnostic test for cholestasis of pregnancy

11. Cholestasis of pregnancy should be terminated – 38 – 39 weeks of gestation

    Acute Fatty liver in pregnancy – pregnancy should be terminated immediately

12. Colostrum contains all in excess except – K F C

    K ⇓ Potassium

    F ⇓ Fat

    C ⇓ Carbohydrate

13. Diaphragm is elevated by 4 cm during pregnancy
    Transverse diameter – ↑ by 2 cm
    Circumference of chest – ↑ by 6 cm

14. Fibrin stabilizing factor – ↓ during pregnancy

15. Intermediate cells – Predominate in vagina at the time of pregnancy

16. Inspiratory capacity – ↑ during pregnancy

17.
    - Oxygen Carrying capacity of blood ↑ during pregnancy
    - Arterio – venous oxygen gradient ↓ in pregnancy
    - Oxygen consumption ↑ during pregnancy

18. Theca lutein cyst:

    Seen in
    - Twin pregnancy
    - Hyperthyroidism
    - Diabetes

19. Hyperemesis gravidarum is not associated with – Post dated pregnancy

Active space

HEART DISEASES IN PREGNANCY

Changes in cardiovascular system in pregnancy 00:00:13

Increases

Cardiac output = Stroke volume x Heart rate

Cardiac output :

- Begins to ↑ = 5 weeks
- maximum during pregnancy = 28 - 32 weeks (40%)
- Overall maximum ↑ in Cardiac output :

1) Immediate post partum (70%)

↓

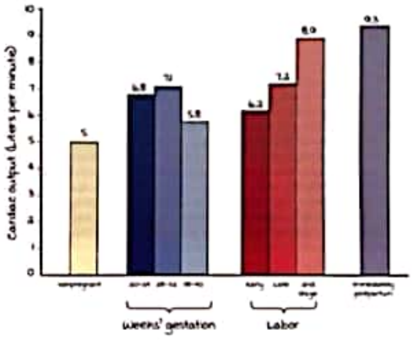
2nd stage of labour (50%)

↓

Late 1st stage of labour

↓

28-32 weeks of pregnancy



Decreases

- main hormone = Progesterone

↓

Smooth muscle relaxant

↓

- Peripheral vascular resistance
- Pulmonary vascular resistance
- BP
  - → Systolic BP
  - Diastolic BP
  - → mean arterial pressure
- maximum ↓ in BP:
  - Diastolic BP
  - maximum 2nd trimester
  - In supine position
- Supine Hypotension Syndrome:

In late 3rd trimester:

Lie supine

↓

Gravid uterus presses On IVC

↓

Venous return ↓

↓

Cardiac output ↓

↓ mother → Hypotension

↓ Fetus → Blood flow ↓ → Fetal Distress

Active space

- At 40 weeks :

  In comparison to
  non - pregnant ♀
  ↓
  CO ↑
  But compared to CO at
  28 - 32 weeks
  ↓
  CO ↓

→ Pressure of gravid
uterus On IVC
pooling of blood in lower
limbs

Femoral venous
pressure → Edema
→ Varicose veins
→ Haemorrhoids

N → 8 mm of Hg
Pregnant female → 20 mm of Hg

→ O_2 Consumption → Arteriovenous O_2 gradient

Normal changes in clinical indications of heart in pregnancy

00:13:36

1. Heart Rate ↑ → Pulse Rate ↑
2. BP ↓
3. Heart rotates upwards and outwards during pregnancy (gravid uterus pushes diaphragm , diaphragm pushes heart)

↓ Palpitations
↓ Apex beat is heard in 4th intercostals space, 2.5 cm lateral to mid clavicular line
↓ ECG ↓ Left axis deviation

4. Heart Sounds :

S_1 → Loud + wide or prominent split
S_2 → Normal
S_3 → Easily heard

5. Murmurs :

   m.c murmur → Ejection Systolic murmur (< 3/6)

   In 20% → Soft diastolic transient murmu

   In 10% → Continuous murmur

- On chest X-Ray :
  - Appears → mild cardiomegaly

Unaffected in pregnancy:

1. JVP / Central Venous Pressure
2. Ejection fraction

Indicators of heart disease during pregnancy 00:19:58

- Symptoms:
  - Clubbing
  - Cyanosis
  - Paroxysmal Nocturnal Dyspnea
  - Orthopnea
  - Pulmonary edema
- ↑ JVP
- S_2 → Loud + Prominent split
- S_4
- Ejection systolic murmur > 3/6
- Diastolic murmur
- Chest X - Ray : marked cardiomegaly
- Any arrhythmia

Heart diseases in pregnancy 00:23:24

- m.c Heart disease in pregnancy → mitral stenosis
- m.c Cause of heart disease in pregnancy in developing countries → RHD
- m.c heart disease in pregnancy in developing countries → mitral stenosis
- m.c Cause of heart disease in pregnancy in developed countries → Congenital Heart Disease (ASD)
- m.c Cyanotic heart disease during pregnancy → TOF
- m.c Congenital valvular heart disease during pregnancy → mitral Valve Prolapse

Clarks classification of heart diseases

- Class I
  - → maternal mortality < 1%
  - → All Congenital heart diseases
- Class II
  - → maternal mortality (15 - 25 %)
- Class III
  - → maternal mortality (25 - 50%)
  - → Diseases :
    1. Pulmonary Hypertension
       - 1°
       - 2° → Eisenmenger syndrome (Highest maternal mortality)
    2. Marfan syndrome with aortic involvement
    3. Coarctation of aorta

- Heart disease with highest risk of maternal mortality → Eisenmenger syndrome
- M.C Heart disease associated with maternal mortality → mitral stenosis
- Regurgitant lesions are tolerated better than stenotic lesions
- Heart diseases in with best prognosis → Congenital heart disease
- Heart diseases in which pregnancy is contraindicated :
  1. All 3 Heart disease belonging to clark's class III
  2. Ejection fraction < 30%
  3. Severe mitral stenosis
  4. Severe aortic stenosis
  5. Any Heart disease which belongs to NYHA class III or class IV

MTP in Heart disease patient in pregnancy :

- Normally in India → 20 weeks
- In Heart Disease → 12 weeks
- Best method → Suction Evacuation

Management of heart disease patient during labour 00:37:16

1. Rest in left lateral position or propped up position
2. Restrict :
   - Per vaginal examination
   - I.V fluids @ 75 ml / hour

3. Best mode of delivery → Vaginal delivery

- Best : Allow patient to go into spontaneous labour
- Induction of labour is safe
- Try vaginal delivery
  ↓
  If 2nd stage of Labour > 30 minutes
  ↓
  Still use vacuum or Forceps
  ↓
  Known as prophylactic use of forceps or vacuum

- In normal conditions :
  2nd stage is prolonged if :
  - Nulliparous → > 2 hours
  - Multiparous → > 1 hour
- Earlier : In Heart disease forceps was preferred
  Now : Vacuum is preferred (Lithotomy position is not needed)

Indications for cesarean section in heart diseases 00:42:32

1. Any disease which involves Aorta :
   - Aortic aneurysm
   - Aortic stenosis
   - Marfan syndrome with aorta involvement
   - Coarctation of Aorta
2. Recent MI/CHF
3. Emergency valve replacement after delivery
4. If patient has been fully coagulated on warfarin at labour or within 2 weeks of labour

- Anesthesia : Epidural Anesthesia

Conditions in which General Anesthesia is used :
1. Intracardiac shunt
2. Hypertrophic Obstructive Cardiomyopathy (HOCM)

3. Pulmonary Hypertension
4. Severe aortic stenosis
5. Severe aortic regurgitation

Management of third stage of labour in heart disease 00:46:29

- Active management of third stage of labour
  → Inj. methyl ergometrine is contraindicated
- Give inj. Diuretics
- Antibody prophylaxis for infective endocarditis after vaginal delivery → Not needed

Contraception of choice in heart disease 00:50:14

Temporary method
→ Earlier : Barrier
→ Now : IUCD

Permanent method
↓
→ undergo vasectomy
↓
If partner refuses
↓
Tubectomy

Tubectomy in heart diseases :

Time
→ Best : After 6 wks of delivery
→ 2nd Best : End of 1st week after delivery

Best
↓
Minilaparotomy

→ Small incision under umbilicus
→ Done under Local Anesthesia

Laparoscopic Sterilisation is Contraindicated

Anticoagulant of choice in pregnancy :

Warfarin
- → Advantage : Strong anticoagulant
- → Disadvantage : Crosses placenta
  - ↓ Chondrodysplasia in fetus

Heparin
- → Cannot cross placenta
- → Weak anticoagulant

→ Period of Gestation:	Anticoagulant of choice:
• < 12 weeks	→ Heparin
• 12 – 36 weeks	→ Warfarin
• 36 weeks	→ Heparin ↓ Stopped 24 hours before labour
• 6 hours after vaginal delivery and 24 hours after Caesarean	→ Restart : Heparin or Warfarin

→ Warfarin is not contraindicated during breast feeding

→ If patient goes into labour on warfarin

↓

Management: Cesarean Section

Mitral stenosis

00:59:23

- Best time to do surgery
  - ↓ 2nd trimester of pregnancy (14 – 18 weeks)
- Surgery of choice
  - ↓ Balloon Valvuloplasty
- Surgery which is Contraindicated in Pregnancy
  - ↓ Valve replacement

ANAEMIA IN PREGNANCY

Iron metabolism in pregnancy

00:00:21

- Total amount of Iron needed in pregnancy = 1000 mg
  Amount of Iron needed by the fetus = 300 mg
  Amount of Iron lost during delivery = 250 mg
- Daily requirement of Iron in pregnancy = 4-6 mg/day
  Trimester wise, I = 1-2 mg/day
  II = 4-5 mg/day
  III = 6 mg/day
- Only 10% of dietary Fe is absorbed
  ↓
  To fulfil requirement of 4-6 mg/day
  ↓
  Amount to be given in diet = 40-60 mg/day
  ↓
  Impossible through diet alone
  ↓
  Fe supplementation is mandatory
- Anemia mukt Bharat programme

Ferrous sulphate (Fe) = 60 mg + Folic acid = 500 mcg

↓ Prophylactic dose of Fe

↓ To target dimorphic anemia

- Should be started from 4th month of pregnancy
- Continued throughout pregnancy (ideally)
- Atleast for 180days during pregnancy and 180 days after delivery
  → To replenish Iron stores

Active space

Anemia in pregnancy

00:07:49

Anemia in pregnancy

- ↓ Physiological anemia
  - Due to haemodilution
  - ↓
  - Hb is never <11g%
- ↓ Pathological anemia
  - Due to other causes like Fe deficiency, Folic acid deficiency etc Hb <11 g %

- Definitions:
  - Anemia in pregnancy: Hb < 11g%
  - Severe anemia in pregnancy: Hb < 7g %
  - Very severe anemia in pregnancy: Hb < 4g%

- Trimester – wise definition of anemia as per WHO and ACOG

Trimester	Hb	Haematocrit
I	< 11g%	< 33%
II	< 10.5g %	< 31 – 32%
III	< 10.5 g –11g%	< 33%
Post-partum	< 10g%	< 30%

- One liners:
  - Most common cause of Anemia in pregnancy
    Physiological anemia > Iron deficiency anemia
  - Most common cause of pathological anemia
    Iron deficiency anemia (IDA)
  - First / most sensitive marker of IDA
    S. ferritin <30mg/ml
  - Most common cause of megaloblastic anemia
    Folic acid deficiency anemia
  - Dose of Folic acid in megaloblastic anemia
    1mg/day
  - Most common anemia after Bariatric surgery
    vit B12 deficiency anemia
  - Most common indirect cause of maternal mortality Anemia
    Most common type of anemia of pregnancy in developing countries: Fe + Folic acid deficiency anemia (Dimorphic anemia)

Active space

- Screening of Anemia in pregnancy
  - Should be done in all females
  - Done at 1st antenatal visit, repeated between 24-28 weeks
  - Screening is done by doing complete blood counts

Management of IDA

00:16:00

I Oral Iron

- Therapeutic dose = 2-3 tablets of Fe /day
  It is given till blood parameters become normal
- 1st blood parameters to improve = Reticulocycle count
  It starts increasing within 7 days and maximum is reached in 10days
- Hb increases after 3 weeks. Rate of increase of
  Hb = 0.7 – 1g%/week
- maintenanace dose = 1 tab/day
  It is given throughout pregnancy + 180 days after delivery

- Problems of oral Fe
  - Poor compliance
  - GI side Effects
  - Cannot be used in inflammatory bowel disease like ulcerative colitis and Crohn's disease
  - Cannot be used in patients after bariatric surgery

II – Parenteral Iron

- Examples:
  - Low molecular weight Dextran
  - Iron sucrose
  - Ferric carboxymaltose

- Rate of increase of Hb after parenteral iron is same as that of oral iron

- Advantages:
  - Not patient dependent
  - Large amounts (1000mg IV) can be given in a single infusion
  - No GI side effects
  - Can be used in patients of IBD, malabsorption, following bariatric surgery

- Calculation of dose of parenteral iron
  - Assume:

    Blood volume = 65ml/kg

    Hb to be corrected till 14g%

    Each g of Hb = 3.3mg of Fe

- Dose of Fe (mg) = (Body weight $\times$ (14 − patient Hb) $\times$ 2.145)
  +
  (Iron to replenish stores)

- Volume of drug to be given = $\dfrac{\text{Dose of iron (mg)}}{\text{Concentration of Fe/mL in the drug}}$

- Example:

  Suppose, 60 kg mother with Hb = 8

  No need for Iron stores

  Using Fe sucrose = 20 mg/ml of Fe

  Dose of Fe = $60 \times (14-8) \times 2.145$

  = 772 mg of Iron

  Volume of drug = $\frac{772}{20}$ = 38.6 mL IV

III – Blood Transfusion

- Indications of Blood transfusion in pregnancy

  1. Pregnancy < 34 wks + Hb <5g%
  2. Pregnancy ≥34 wks + Hb <7g%
  3. At time of labour + Hb <7g%
  4. Acute haemorrhage causing Hb <6g%
  5. Any time in patient with heart failure with low Hb

DIABETES IN PREGNANCY

Carbohydrate metabolism in pregnancy

00:00:02

- Insulin resistance in pregnancy
  - ↓ mainly due to HPL
  - ↓ Other hormones
    - Estrogen
    - Progesterone
    - cortisol
  - ↓ 24-28 wks of pregnancy
- Fetus is entirely dependent on mother for glucose requirement

mother

↓ GLUT 1 & GLUT 3

Facilitated diffusion → glucose reaches the fetus

- In pregnancy – Fasting hypoglycemia & Post prandial hyperglycemia
- Glycosuria – Ⓝ in pregnancy
- maternal insulin cannot cross placenta
- Fetus starts producing insulin @ 12 wks of pregnancy
- maternal hyperglycemia → Fetal hyperglycemia

↓

Hypertrophy of β cell of fetal pancreas

↓

↑ insulin in fetus

- ↓ ↑ growth of fetus (macrosomia)
- ↓ ↓ Surfactant production
  - ↓ ↑ Chances of RDS
- ↓ Neonatal hypoglycemia

Diabetes in pregnancy

00:08:32

Diabetic female has conceived
↓
Overt diabetes
↓
Blood sugar levels are raised from day 1

In diabetes → ↑ blood sugar from day 1
↓
↑ free radicals
↓
Increased chances of congenital malformation

Normoglycemic female during pregnancy, develops insulin resistance
↓
Becomes diabetic
↓
Gestational diabetes
↓
Blood sugar levels are raised after 24-28 wks of pregnancy

Free radicals are formed after 24 – 28 wks
↓
By this time organogenesis is complete
↓
No congenital malformation

Overt diabetes

FBS ≥ 126mg/dl
RBS = ≥ 200mg/dl
HbA1C ≥ 6.5%

- Tests to predict the chances of congenital malformation in babies of overt diabetes mother

↓
HbA1C

<6.5% → No chances
6.5–9.5 → 5 %
≥9.5 → 20 %

- Test to detect congenital malformation in babies of diabetic mother -TIFFA – level 2 ultrasound scan @ 16-20 wks of pregnancy
- TIFFA should be done in overt & gestational diabetes mellitus
- methods to prevent congenital malformations in babies of overt diabetic mothers
  1. Strict control over glucose
  2. Folic acid supplementation (400 mg/day)
- DOC – Insulin
  All Oral hypoglycemic drug are contraindicated

1. m.c system involved in congenital malformation : CVS > CNS
2. m.c congenital anomaly seen – VSD > NTD
3. most specific anomaly – Caudal regression syndrome or sacral agenesis
4. most specific cardiovascular anomaly – TGA
5. m.c cardiac anomaly seen in babies of diabetic mother – VSD
6. m.c cardiovascular finding seen in babies of diabetic mother – HOCM
7. Least common cardiac anomaly seen in babies of diabetic mother – TOF

Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Gestational diabetes 00:28:25

- Diagnosis of gestational diabetes
  - 2 step approach by ACOG
  - 1 step approach by WHO (DIPSI)

2 step approach

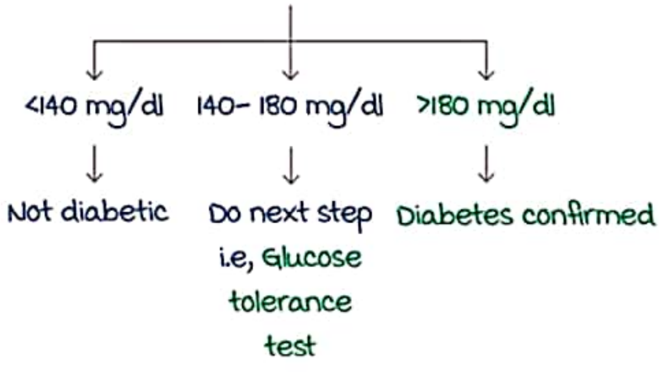
1st step: Screening test: Glucose challenge test (GCT) time 24-28 wks

No fasting is required

method : 50 gms glucose to patient

↓ 1hr

Check blood sugar levels



<140 mg/dl → Not diabetic

140- 180 mg/dl → Do next step i.e, Glucose tolerance test

>180 mg/dl → Diabetes confirmed

Note:

1. ACOG recommends universal screening in all pregnant females irrespective of risk factors

   In low risk females, GCT to be done only once between 24-28wks

   In high risk females, GCT to be done @ Ist antenatal visit & repeated at 24-28 wks

2. High risk females
   - Obese
   - Age > 30 yrs
   - Previous h/o GDM
   - Family h/o diabetes
   - Previous h/o congenital malformation
   - Previous h/o still birth
   - Previous h/o IUGR
   - ≥ 3 abortions
   - Previous h/o macrosomia
   - Polyhydramnios

2nd step: perform a 3hr 100 gm OGTT (glucose tolerance test)

Preparation: Overnight fasting (8- 10 hrs)

↓

1st sample = FBS sample

↓

Give 100 gms glucose

↓

↓

2nd sample 1 hr postprandial
3rd sample 2 hr postprandial
4th sample 3 hr postprandial

Total = 4 samples

If any 2/ > 2 values are abnormal → diabetes is confirmed

	Carpenter and coustan criteria	National diabetes criteria (India)
Fasting	95 mg/dl	105 mg/dl
1hr	180 mg/dl	190 mg/dl
2hr	155 mg/dl	165 mg/dl
3hr	140 mg/dl	145 mg/dl

One step approach

- Only screening test
- Do a 2hr 75gm OGTT

Directly @ 24–28wks → Ask pt to do overnight fasting (8–10hrs)
↓
1st sample = FBS sample
↓
Do 2 hr 75 gm OGTT
↓
Give 75 gm oral glucose
↓
After 1hr → 2nd sample
After 2hr → 3rd sample

Total 3 samples

If 1 or > 1 value is abnormal, → diabetic

Criteria for 75 gms GTT

Fasting – 92
1 hr – 180
2 hr – 153

Note: Unlike ACOG, WHO recommends tests only in high risk females

DIPSI criteria followed in India

- No fasting needed

- Whenever female comes for antenatal visit

↓

Irrespective of previous meals

↓

Give 75 gm of glucose

↓

After 2hrs, check blood sugars levels

↓

≥ 120 ↓ Glucose intolerance

≥ 140 ↓ GDM

≥ 200 ↓ Overt diabetes

- This test has to be done in all pregnant females

Management of diabetes in pregnancy

00:45:10

1st step = Diet modification + exercise

↓

2wks

↓

Aim for metabolic goals

Fasting = 70–95

1hr postprandial = < 140

2hr postprandial = < 120

Hb A1C < 6.5

Not attained by 2 wks → Insulin

- DOC for treating diabetes in pregnancy – Insulin
- During pregnancy insulin dose is increased
- During labour (patient is on liquid diet / Nil oral) – Dose of Insulin ↓
- Oral hypoglycemic – contraindicated during pregnancy because

1. They can cross placenta → Fetal hypoglycemia
2. Pregnancy – diabetogenic state

Insulin –strong drug

OHA – weak drugs

Diabetes in pregnancy : fetal surveillance 00:50:38

- Begin by 32 – 34 wks
- If growth restriction is seen → Start monitoring from 28 wks
- Overt diabetes + GDM patients on Insulin

↓

Admit at 34wks

- methods of surveillance
  1. Daily fetal kick count
  2. Biweekly NST
  3. Weekly biophysical score

Time of delivery

- GDM patient, controlled control on diet: ≥ 39wks to 40wks + 6 days
- GDM control by insulin → ≥ 39 wks to 39wks + 6 days
- Overt diabetes – 37wks to 37 wks + 6 days

mode of delivery : Vaginal delivery

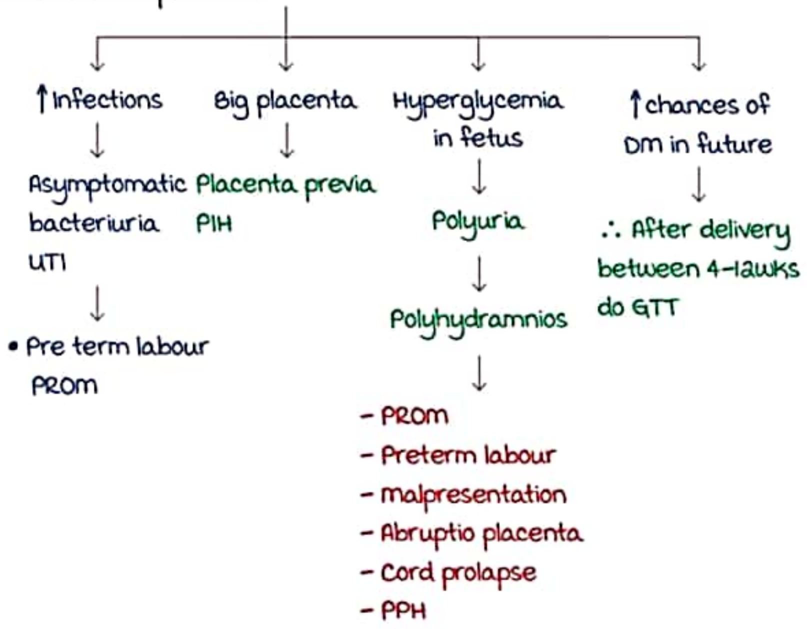
If weight of fetus is ≥ 4.5kg in diabetic female

↓

Cesarean section

Complications of diabetes in pregnancy 00:54:20

Maternal complications



- ↑ Infections ↓ Asymptomatic bacteriuria, UTI ↓ • Pre term labour, PROM
- Big placenta ↓ Placenta previa, PIH
- Hyperglycemia in fetus ↓ Polyuria ↓ Polyhydramnios ↓
  - PROM
  - Preterm labour
  - malpresentation
  - Abruptio placenta
  - Cord prolapse
  - PPH
- ↑ chances of DM in future ↓ ∴ After delivery between 4–12wks do GTT

Active space

Fetal complications

1] Fetal Hyperglycemia

↓

↑Insulin

↓

a] macrosomia / ↑ growth of fetus

↑ in wt of fetus ≥ 4.5 Kgs

In India ≥ 4 Kgs

Risk factors for macrosomia

- Male fetus
- Postdated pregnancy
- Diabetes in mother

USG parameter to detect macrosomia – Abdominal circumference

↓

≥ 35cms → Macrosomia

- Organ least affected in macrosomia – Brain
- Management: caesarean section is done
  - wt of fetus ≥ 4.5 Kg in diabetic female
  - wt of fetus ≥5 Kg in non diabetic females
- During vaginal, macrosomia can lead to shoulder dystocia

Fetal complication : shoulder dystocia 01:02:28

- Delay in delivery of shoulder > 1 min after delivery of head
- Sudden pulling back of head towards the perineum known as turtle sign

Risk factors for shoulder dystocia

(mnemonic – DOPA)

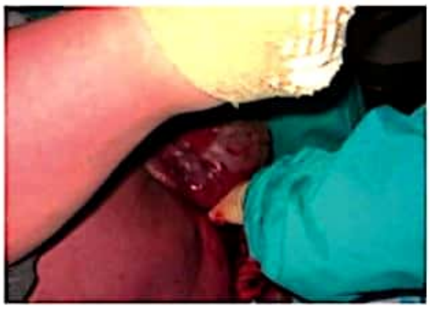
D – Maternal diabetes

O [Maternal obesity / Fetal obesity

P – Post dated pregnancy

A – Anencephaly (pseudo shoulder dystocia)

Shoulder Dystocia turtle sign



Management: Shoulder dystocia drill

(Mnemonic : HELPERR)

H – Call for help

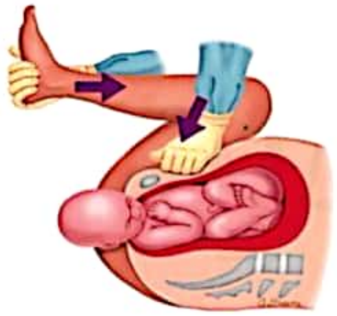
E – Give episiotomy

L – Flexion of legs against abdomen (McRoberts maneuver) and abduction of hips

- M.C nerve injured during this maneuver – Lateral femoral cutaneous nerve of thigh

Mc Roberts maneuver

McRoberts maneuver and suprapubic pressure



- First & best maneuver in management of shoulder dystocia – Mc Roberts maneuver

P – Give suprapubic pressure

Fundal pressure contraindicated

E – Enter vagina: Hold and rotate shoulders

- Woods corkscrew maneuver
- Rubin maneuver

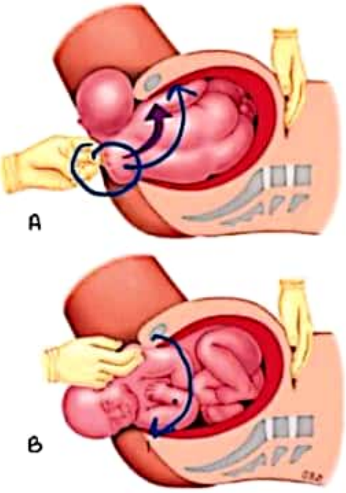
R – Remove the posterior arm of baby

jacquemier maneuver / Barnum maneuver

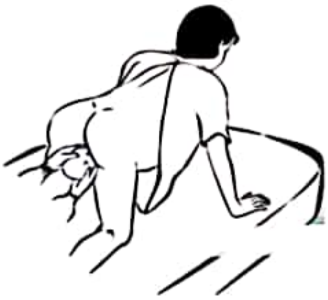
R – Rotate patient to all 4 limb

Gaskin or all 4 maneuver

Wood's corkscrew maneuver



Gaskin maneuver



- Last maneuver : zavanelli maneuver

  head of the fetus pushed back into the uterus followed by caesarean section

- Destructive procedures which are not done but can be done are
  1. Cleidotomy – clavicle
  2. Symphiosotomy – dividing public symphysis in mother
- m.C. maternal complication of shoulder dystocia – PPH
- m.C fetal complication – Brachial plexus injury
- m.C bone injured – Clavicle #

Other fetal complications :

1. ↑ chances of death of the fetus
   - Occurs at <20 wks/<500 gms in wt – Abortion ↑
   - Occurs at >20 wks/≥ 500 gms in wt – IUD of fetus ↑
   - Occurs during delivery – Still birth ↑
2. Rarely IUGR may be seen
   1. Diabetes + PIH
   2. Overt diabetes with vasculopathy

Intrauterine death/ IUD

1:23:00

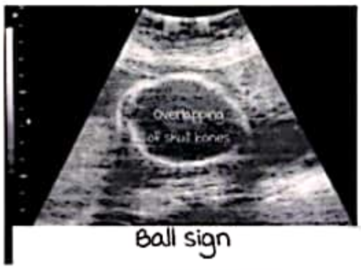
- Signs of IUD on X ray

  1st sign – robert Sign – presence of gas in great vessels in fetus

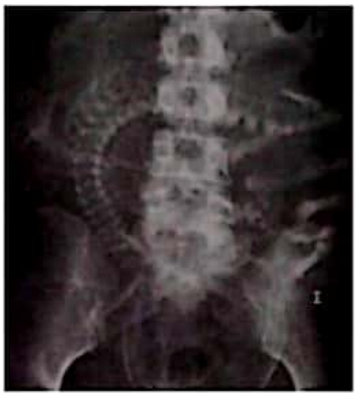
  Becomes +ve within 12–24hrs of fetal death

  2nd sign – Spalding sign
  - Overlapping of cranial bones of fetus
  - Becomes positive within a week of fetal death

Spalding sign on usg



Ball sign



  3rd sign – Ball sign
  - Hyperflexion / Hyper extension of fetal spine

Neonatal complications in diabetes

01:25:38

- Prematurity
  RDS
- Hypoglycemia
  (<40 mg/dl)
- ↓K^+
  ↓Ca^{++}
  ↓mg^{++}
- Hyperviscosity Syndrome
  ↓
  Polycythemia
  +
  Hyperbilirubinemia

- Anaemia & mental retardation – not seen in babies of diabetic mother
- Best test for assessing lung maturity in fetus of diabetic mother – Phosphatidyl glycerol
  - If present in amniotic fluid → Lungs mature
  - If absent in amniotic fluid → Lungs not mature
- Tocolytic C/I in diabetic mother
  β – agonists – Ritrodrine
  Isosuxprine
  Terbutaline
  Salbutamol
- Tocolytic of choice in diabetic mother – Nifedipine

Active space

PREGNANCY INDUCED HYPERTENSION – 1

Hypertension in pregnancy 00:00:30

- BP more than or equal to 140 / 90 mmHg on 2 occasions 4 hours apart
- Note in pregnancy – Diastole BP determined by disappearance of sound (Korotkoffsound V)
- It should be recorded in sitting position

Two situations

Hypertensive female has conceived
↓
Chronic hypertension in Pregnancy

Normotensive female who has conceived & during pregnancy due to placental pathology at 20 weeks → BP increases
↓
PIH

Chronic hypertension in pregnancy	PIH
• Past history of hypertension present	• Not present
• Increase in BP is seen even before 20 weeks Of preanancu	• Increase in BP is seen only after 20 weeks of pregnancy
• BP does not come back to normal with in 12 weeks of pregnancy	• BP comes back to normal with in 12 weeks of delivery

PIH
↓
Gestational Hypertension | Pre-eclampsia
↓
- ↑in BP after 20 weeks of pregnancy
- BP will come back to normal within 12 weeks of delivery

- Not present	- Either proteinuria or - Signs of end organ damage

Proteinuria	End organ damage
• Excretion of proteins → more than or equal to 300 mg in 24 hours or • more than or equal to 30 mg/dl (0.3g/l) or • Urine protein: Creatinine ratio more than 0.3 or • Dipstick method = 1 ⊕ =0.3 g/L • Traces is not taken as proteinuria = (0.15 to 0.3g/l)	• Serum creatinine more than 1.1 • Platelet count less than 1 lakh • Liver enzymes are raised to more than 2 times their normal value Note → ALP is normally raised in pregnancy, so it has no significance • Pulmonary edema • Cerebral/visual symptoms.

Pre-eclampsia

00:14:07

mild preeclampsia
- BP = more than or equal to 140/90 but < 160/110
- Signs of End organ damage are not there

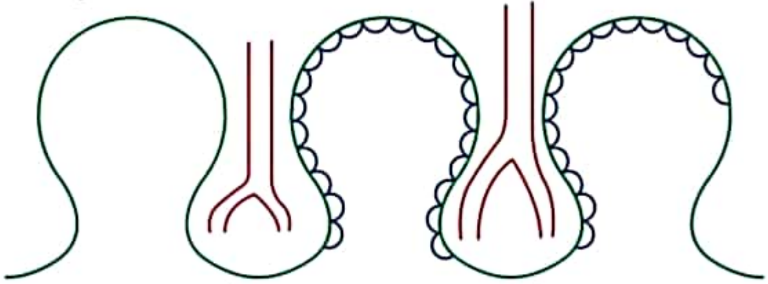
Severe preeclampsia
- BP = more than or equal to 160/110
- Signs of End organ damage present

Chronic hypertension with superimposed preeclampsia

- In a pregnant chronic hypertensive female if at 20 weeks:
  - BP becomes uncontrollable

    Or
  - Proteinuria
  - Signs of end organ damage present

Pathology



Normally → when spiral arteries open in the

Trophoblastic invasion
- intervillous space → Extravillous
- Cytotrophoblast → It will replace
- Lining of the maternal artery and convert them
  ↓
- From high resistance vessels
  ↓
- Low resistance vessels

- If trophoblastic invasion is incomplete
  ↓
  Resistance in maternal artery remains high
  ↓
  PIH

Normal pregnancu	PIH
• Spiral arteries ↓ Angiogenesis ↓ Diameter ↑ ↓ Pressure ↓	Absent
Bought about by: - VEGF - Placental growth factor	- VEGF ↓ - Placental growth factor ↓ 1) Soluble tyrosine kinase like receptor = sFlt 1 ↑ 2) Endoglin ↑

- Vasodilators are NO ↑	NO ↓
- Vasoconstrictors →	→ increased
Thromboxane A_2 ↓	
prostacyclin ↓	

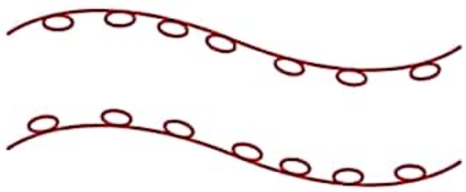
- Due to vasoconstriction and increased resistance in spiral arteries → volume of blood coming to IVS ↓ → placental ischaemia → Pale
  → Small

- Placental ischaemia

↓

Inflammatory mediators released

↓



acts on capillary endothelium

↓

Capillaries leak

↓ Collection of fluid in third space

↓

Edema

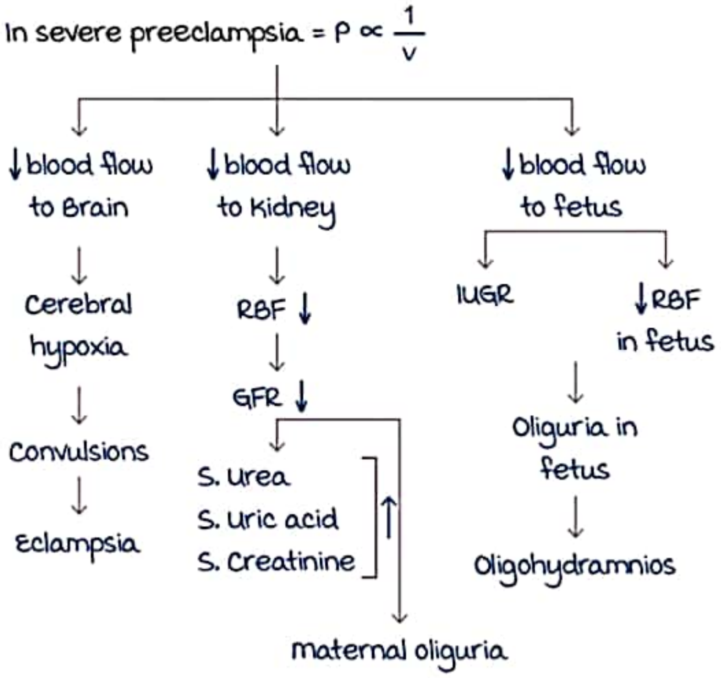
↓ Hemoconcentration → Platelet dysfunction

↓

Thrombosis in blood vessels

↓

multiple organ dysfunction


In severe preeclampsia = $P \propto \frac{1}{V}$

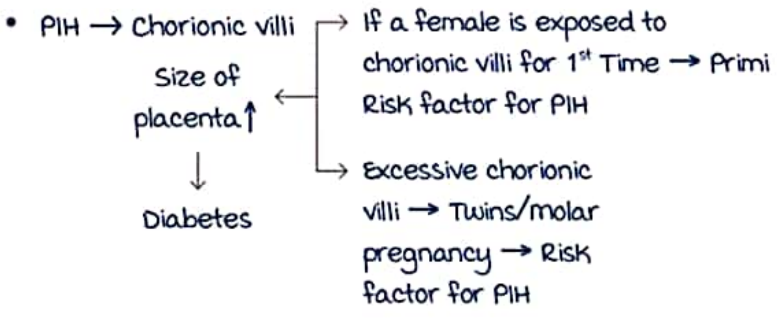
↓ blood flow to Brain → Cerebral hypoxia → Convulsions → Eclampsia

↓ blood flow to Kidney → RBF ↓ → GFR ↓ → S. Urea, S. Uric acid, S. Creatinine ↑; GFR ↓ → maternal oliguria

↓ blood flow to fetus → IUGR; ↓ RBF in fetus → Oliguria in fetus → Oligohydramnios

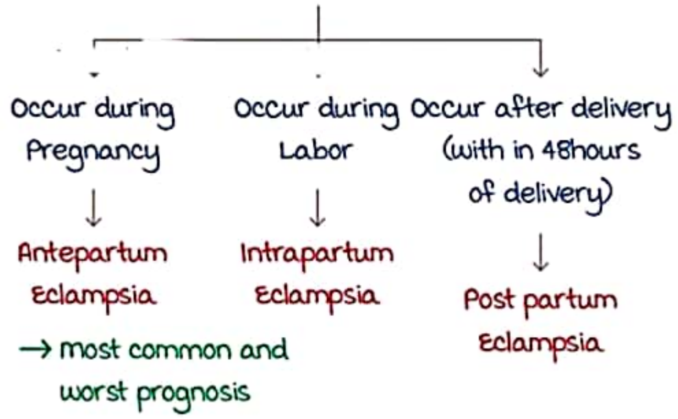
- most common organ involved in PIH: Kidney ↓ On HPE ↓ Glomeruloendotheliosis
- Another characteristic feature of PIH is:
  Normally in pregnancy TH_1 response is suppressed and switch to TH_2
- This does not happen in PIH

Important concepts:


- PIH → Chorionic villi → If a female is exposed to chorionic villi for 1st Time → Primi Risk factor for PIH
  → Excessive chorionic villi → Twins/molar pregnancy → Risk factor for PIH
  → Size of placenta ↑ → Diabetes

- Fetus is not prerequisite for PIH
- It is not necessary that these chorionic villi should be intrauterine → PE can develop in ectopic pregnancy

- Eclampsia is complication of severe pre – eclampsia
- Eclampsia → Patient has → Generalized Tonic clonic Seizures



Occur during Pregnancy → Antepartum Eclampsia → most common and worst prognosis

Occur during Labor → Intrapartum Eclampsia

Occur after delivery (with in 48hours of delivery) → Post partum Eclampsia

Signs and symptoms of Impending eclampsia in patients of severe preeclampsia:

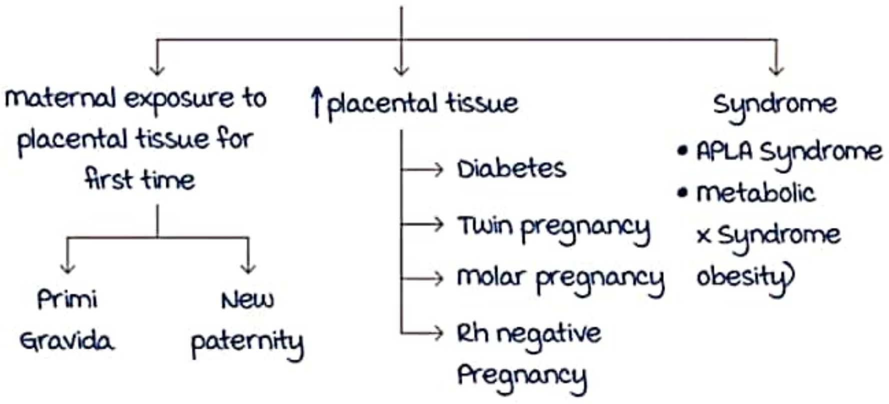
1. Oliguria
2. Epigastric pain (due to stretching of liver capsule)
3. visual symptoms
   - most common – scotoma
   - Reversible blindness
   - Blurring of vision /Diplopia

   Visual symptoms are due to HTN Retinopathy

   Classification →
   Keith Wagner Baker classification
4. Headache

Risk factors for PIH

00:43:30



maternal exposure to placental tissue for first time
- Primi Gravida
- New paternity

↑ placental tissue
- Diabetes
- Twin pregnancy
- molar pregnancy
- Rh negative Pregnancy

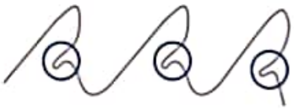
Syndrome
- APLA Syndrome
- metabolic x Syndrome obesity)

Protective: Smoking

- Patients with placenta previa do not develop pre-eclampsia
- But there is a positive association between abruption and pre-eclampsia
- Age of patient more than 35years is also a risk factor

Tests which can predict PIH:

- most commonly used test
  - → Uterine artery doppler



  - → Diastolic match normally disappears between 22 – 24 wks of pregnancy
  - → If present → PIH
- Outdated test
  - → Giants roll over test
- Recent predictors
  - → VEGF = ↓
  - → PLGF = ↓
  - → SFlt] ↑
  - → Endoglin] ↑
  - → NO = ↓
  - → Tromboxane A_2 = ↑
  - → ↓ urinary calcium excretion

Findings in PIH not predictors:

1. Hemoconcentration
2. Oliguria
3. ↑ uric acid levels

Drug to prevent PIH 00:52:30

- Best → Aspirin (↓ Thromboxane A_2) → Dose-50 – 150 mg OD 12-28 weeks of pregnancy
- Heparin and aspirin
- Calcium supplementation only if female has ↓ calcium
- Regular exercise

No role of:

- Bed rest
- Diet salt restriction
- Fish oil
- Antioxidants
- Heparin alone

Management of PIH

00:55:02

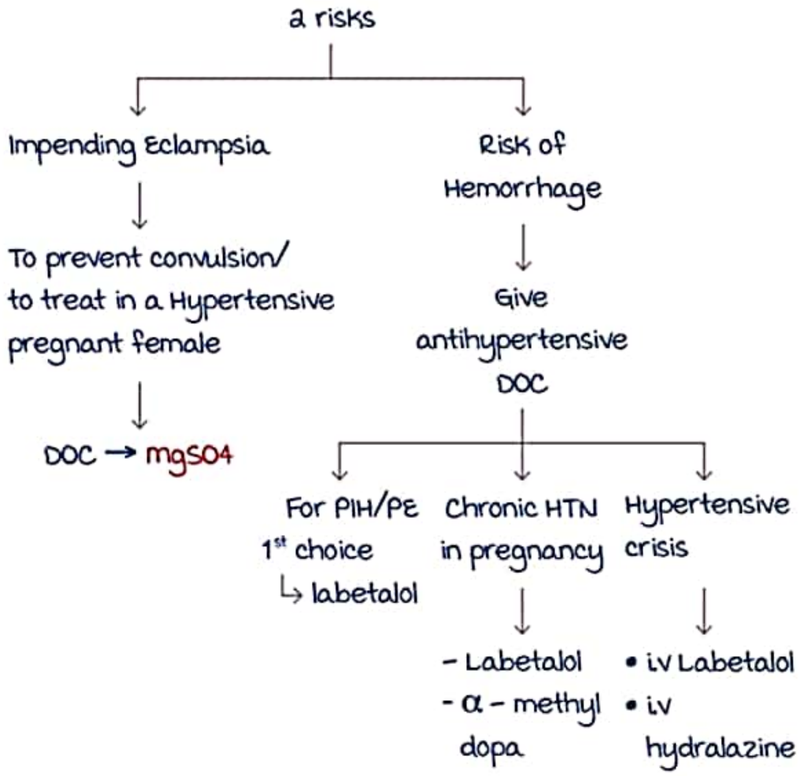
- Definitive management → Termination of pregnancy (TOP)
- TOP → mild preeclampsia → 37 weeks
  Severe preeclampsia → 34 weeks
  Eclampsia } Immediate termination
  HELLP Syndrome } Irrespective of Gestational age
- mode of delivery → Vaginal delivery
  - Cesarian not preferred
  - If cesarian done → Epidural is preferred than spinal
    → GA not given

Management of mild PE:

- Role of antihypertensives +/−
  - Indication for starting antihypertensives:
    1. Severe ↑ BP (≥ 160/110)
    2. If BP is more than or equal to 150/100 then it should be persistently increased

Definitive management : Termination of pregnancy at 37 weeks

Management of severe PE:


2 risks
Impending Eclampsia
To prevent convulsion/ to treat in a Hypertensive pregnant female
DOC → mgSO4
Risk of Hemorrhage
Give antihypertensive DOC
For PIH/PE 1st choice ↳ labetalol
Chronic HTN in pregnancy
- Labetalol
- α - methyl dopa
Hypertensive crisis
• iv Labetalol
• iv hydralazine

- Definitive management : Termination of pregnancy at 34 weeks

Anti hypertensives in pregnancy:

- Safest anti-hypertensive Alpha methyldopa

Safe	Contraindicated
1. Labetalol ($\alpha + \beta$ blockers)	1. ACE inhibitors
2. α methyldopa	2. Angiotension receptor blocker - Losartan
3. Hydralazine	3. β blockers
4. Nifedipine	4. Diuretics
5. Nitroglycerine	5. Diazoxide
6. Sodium Nitroprusside (resistant cases)	

Management of hypertensive crisis

- DOC → Labetalol i.v → Dose → Initial → 20mg

  maximum total dose → 220mg
- I.V. Labetalol is contraindicated in asthmatic patients.

20mg
↓ 10mins
40mg
↓ 10min
80mg
↓ 10mins
80mg

- 2nd → DOC I.V Hydralazine
- 3rd → Sustained release nifedipine
- 4th → I.V NTG
- Last Resort → Sodium Nitroprusside DOC for Refractory HTN

Active space

PIH-2

Management of eclampsia 00:00:06

- 1st step in management → Airway management

↓

- DOC to Treat and Prevent convulsions → $mgSO_4$

↓

- Simultaneously, Anti hypertensive → Labetalol (i.v),
  max.dose – 220mg

  [Reason–Hypertensive crisis: BP > 160/110 mm/hg]

↓

- Definitive management → Termination of pregnancy [TOP] immediately irrespective of gestational age

Magnesium sulphate 00:02:05

- DOC to prevent and treat convulsions in a hypertensive female
- Not an antiepileptic drug

  Reason – $mgSO_4$ can prevent only convulsions due to vasoconstriction because of PIH [pregnancy induced Hypertension]

- mechanism of action
  - Centrally acting

    acts on NMDA receptors in brain

    ↓

    Cerebral vasodilation

    ↓

    ↓ cerebral hypoxia
  - Blocks Ca^{2+} channel

    ∴ CCB's (Ca2+ channel blockers) should not be combined with $mgSO_4$

    Risk of causing respiratory arrest
- Prophylactic use
  - Impending eclampsia
  - Severe pre-eclampsia[PE]
  - HELLP syndrome

Pritchard regimen of $MgSO_4$

00:05:08

Loading dose

4gm + 10 gm

↓ 4gm: 20% solution [slow IV]

↓ 10 gm: 50% of solution [I.m–5gm in each buttock]

- maintenance dose = 5 gm
  - ↓ Given every 4th hourly till 24 hrs after delivery (or) 24 hrs after last convulsion
  - ↓ 50% solution [I.m – given on alternate buttocks each time to prevent abscess]

Dose calculation

Magnesium Sulfate
Injection, USP
50%

- Vial available → 10ml vial
  - Contains 50% $mgSO_4$
  - ∴ 10ml vial → Has 5 gm of $mgSO_4$
  - ∴ 1ml = 0.5 gm
- For i.v use → 20% solutiond required

20 ml syringe

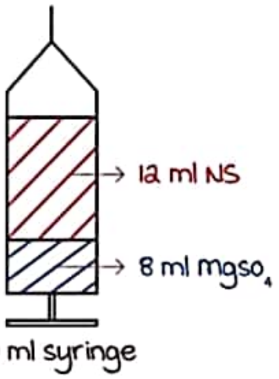
⇓

8 ml of $mgSO_4$ (~ 4 gms)

+

Add 12 ml of Normal saline (NS)

∴ In 20ml, there is 4 gm of $mgSO_4$ = 20%



Therapeutic range of $mgSO_4$

- Narrow therapeutic range
  → 4–7 mEq/L
  (or)
  2–3.5 mmol/L
  (or)
  4.8–8.4 mg/dL

4 Parameters checked before loading dose →

1. Knee jerk / Patellar reflex – Present
2. Urine output ≥ 30 ml / hr
3. Respiratory rate ≥ 12 breaths /min
4. SpO_2 ≥ 96%

$MgSO_4$ toxicity and SIBAI regime 00:16:30

A – mgSO4 Toxicity

1. Signs of $mgSO_4$ toxicity
   a. Loss of Knee jerk / Patellar reflex : when mgSO4 ≥ 10meq/L

   1st sign

   b. Slurring of speech & Diaphoresis
   c. Respiratory depression at $mgSO_4$ ≥ 12 meq/L
   d. Respiratory arrest at $mgSO_4$ ≥ 15 meq/L
   e. Cardiac arrest : $mgSO_4$ = 25–30 meq/L

Note:

Oliguria is not a sign of $mgSO_4$ toxicity, but is a parameter to be checked before loading dose

[Reason: $mgSO_4$ excreted through Kidney]

2. Antidote for $mgSO_4$ toxicity
   - Calcium gluconate [10 ml of 10% of Ca^{2+} gluconate]
   - Alternative: $CaCl_2$

3. Absolute contraindication of $mgSO_4$
   a. myasthenia gravis
   b. Renal failure

B. SIBAI regime

- Route – i.v only
- Loading dose ⇒ 6 gm i.v × 20 mins
- Maintenance dose ⇒ 2 gm i.v
- If convulsion recurs ⇒ 2–4 gm in 5 mins

Status eclampticus

- Uncontrolled convulsions despite $mgSO_4$ administration
- DOC – Thiopentone sodium

Active space

HELLP syndrome

00:21:30

- A complication which is seen in 3rd trimester

↓

Patient complains of abdominal pain [Epigastric / right upper quadrant]

- 85% cases have high B.P, but 15% cases may have normal BP
- Recurrent rate = 4–7%
- HELLP –

1. Hemolysis
   - LDH ≥ 600 IU
   - Serum bilirubin ≥ 1.2
   - ↓ Haptoglobin level
   - On peripheral blood smear: Helmet cells, Tear drop cells, Schistocytes
2. ELevated liver enzymes
   - SGOT & SGPT ≥ 70 IU
3. LP: Low platelet count
   - Platelet < 1 lakh

- Tennessee criteria
  - To diagnose HELLP syndrome
  - Criteria: LDH > 600 IU
    SGOT, SGPT ≥ 70 IU
    Platelet < 1 lakh

- Differential Diagnosis

– AFLP [Acute Fatty Liver of Pregnancy]

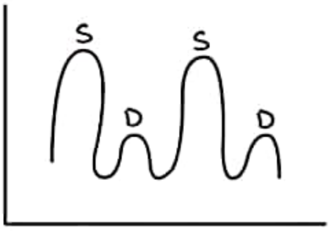
– Conditions seen in AFLP but not in HELLP
  - i. Hypoglycemia
  - ii. Hepatorenal syndrome
  - iii. Features of DIC
  - iv. Development of 2° complications like pancreatitis

Active space

- Management of HELLP syndrome
  1. Prophylactic $mgSO_4$
  2. Antihypertensives
  3. Definitive management → Immediate Termination of pregnancy

Umbilical artery doppler study 00:27:50

a. Normal



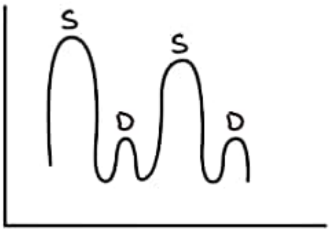
S - systole
D - Diastole

- Forward flow
- As the period of gestation ↑, resistance of blood vessels ↓

  ∴ Diastolic flow increases

  - S/D ratio decreases (< 3)

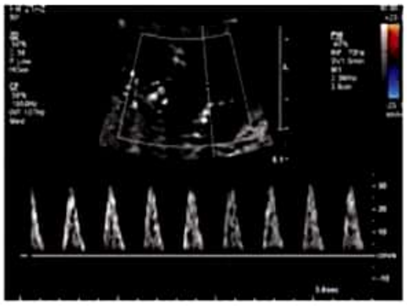
b. PIH

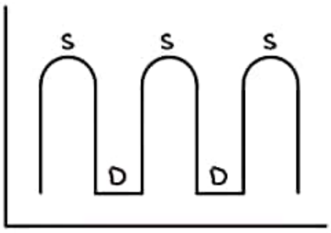


- S/D ratio increases (> 3)

during diastole → Less blood enters the vessel due to ↑ vascular resistance

c. Absent end diastolic flow





- absent diastolic flow

↓

Indication of TOP at ≥ 34 weeks

- If period of gestation is < 34 weeks

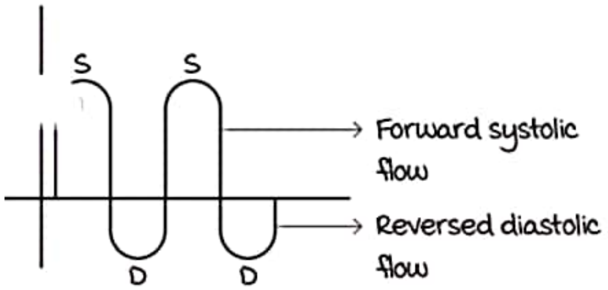
↓

- Give corticosteroids
- Continuous fetal monitoring [NST and BPP]

↓

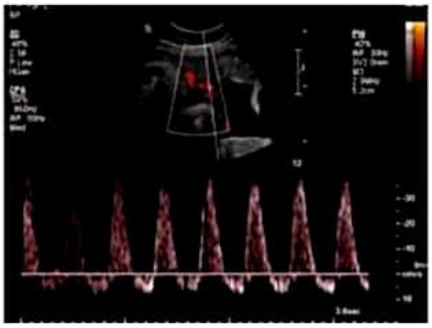
[Reason: absent End diastolic flow $\xrightarrow[\text{a week}]{\text{within}}$ Reversal of flow]

d. Reversed Diastolic flow



⇓

Indication for Immediate termination of pregnancy [TOP]



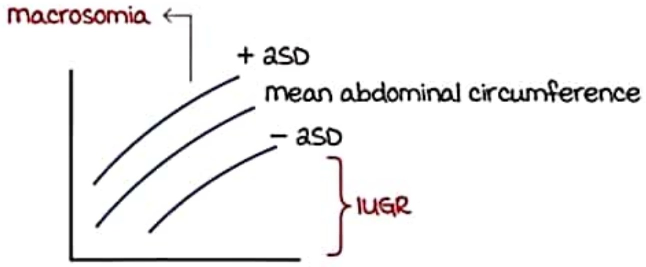
1. Indications for immediate TOP irrespective of Gestational Age in PIH
   - a. Eclampsia
   - b. HELLP syndrome
   - c. Fetal distress / Abruptio placenta
   - d. Uncontrolled BP
   - e. ↑ serum creatinine
   - f. Reversal of diastolic flow[Umbilical Artery Doppler]

2. Indications for TOP at 34 weeks in PIH
   - a. Severe pre-eclampsia
   - b. Absent end diastolic flow

IUGR

IUGR – Intrauterine Growth Restriction :

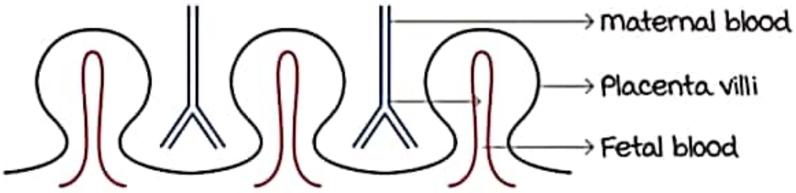
- manifestation of disease.
  - Due to: maternal , placental , fetal problems
- Weight of fetus: < 10 percentile of weight appropriate for that gestational age
  - < 2 SD below
- First change: Abdominal circumference of fetus ↓



Normal growth rate of fetus

00:05:00

- Upto 14 – 15 weeks = 5 g/day
- Upto 20 weeks = 10 g/day
- From 32 – 34 weeks = 30–35 g/day
- Factors influencing growth of fetus:
  1. Growth of the parents
  2. Hormone responsible for growth of fetus in intrauterine life
     ↓
     Insulin like growth factor
  3. Availability of substrates (glucose etc)



- Maternal PIH

→ P↑ ($P \propto \frac{1}{V}$)

V ↓ (volume of blood to intervillous)

Substrates ↓

↓

IUGR

- Smoking:
  - Does not affect maternal weight gain
  - Vasoconstriction → decrease Volume → decrease substrates → IUGR
  - Active / passive smoking → Leads to IUGR

IUGR : classification 00:10:42

IUGR (↓ growth)

Early in pregnancy
→ No. of cells ↓
AKA Type 1 IUGR
↓
Bad Prognosis

Late in pregnancy
→ 32 - 34 weeks
→ Size of cells ↓
→ No. of cells : normal
↓
Type 2 IUGR
↓
Good prognosis

- Type 1 IUGR
  → All USG parameters are affected
  Symmetrical IUGR {
  Abdominal circumference (AC) ↓
  Head circumference (HC) ↓
  Biparietal Diameter (BPD) ↓
  Femur length (FL) ↓
  Weight ↓ }

- Type 2 IUGR
  → Later in pregnancy
  ↓
  Blood is collected from peripheral organs and sent to brain } Brain Sparing Effect
  → 1st organ : Abdomen affected
  AC ↓
  Weight ↓ } Asymmetrical IUGR
  But: BPD = Normal
  HC = Normal
  FL = Normal
  Crown Rump length = Normal

Ponderal Index (PI):

- $PI = \frac{\text{Estimated Fetal weight}}{(\text{Femur length})^3}$

- Type 1 IUGR
  → PI = Normal
  → Causes:
    Chronic anomaly
    Torch infections
    Genetic disease

- Type 2 IUGR
  → PI = ↓
  → Causes:
    Placental insufficiency
    PIH
    Chronic Renal Disease

Causes of IUGR 00:20:25

Maternal	Placental	Fetal
→ PIH	→ Placental insufficiency	→ Chronic Anomaly
→ Placental insufficiency	→ Abnormal placentation	→ Genetic disease
→ Chronic renal disease	→ Calcifications	→ Infections
→ Heart Disease (NYHA Class III /IV)		
→ Connective tissue disorder		
→ Infections		
→ Diabetes with Vasculopathy		
→ Diabetes with PIH		

Diagnosis of IUGR 00:23:55

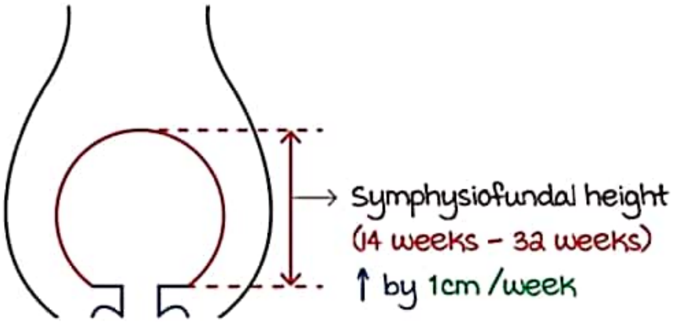
1. Identify mother at risk :
   (1) PIH
   (2) Chronic Renal Disease
   (3) BMI ↓
   (4) Less weight gain during pregnancy
   (5) Infections

2. Sure about Gestational Age of fetus

Trimester	USG Parameter
→ 1st Trimester (upto 14 weeks)	→ Crown Rump Length
→ 14-20 weeks	→ Biparietal Diameter
→ 3rd Trimester	→ Femur Length

- Overall best time to do USG, to know gestational age : 1st trimester
- Best parameter: Crown Rump Length

Clinical Diagnosis :


Symphysiofundal height
(14 weeks – 32 weeks)
↑ by 1cm /week

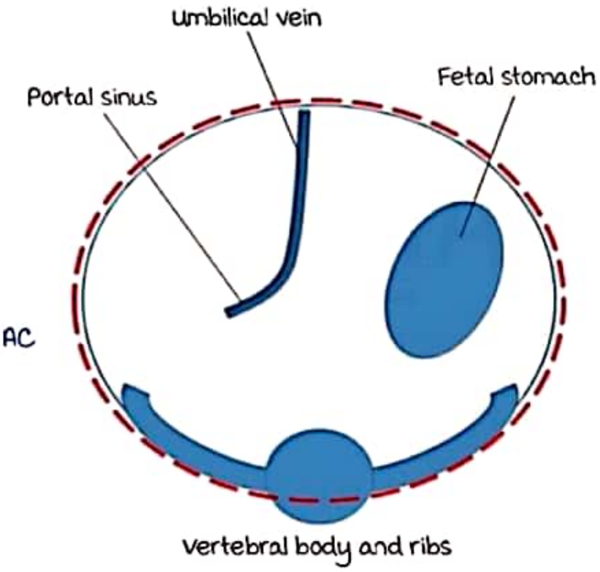
- Lag in symphysiofundal height by 4 cms → IUGR
- measure the abdominal circumference of mother :
  - Abdominal circumference at 30 weeks = 30 inches
    Then ↑ by 1 inch / week after 30 weeks
- On USG, Best parameter to assess growth of fetus → Abdominal circumference

USG parameter to assess fetal growth

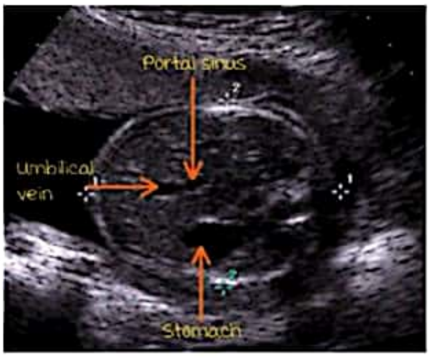
00:32:21

1. Single measurement for fetal growth: Abdominal circumference (AC)

- To detect IUGR / macrosomia
- Plane for measuring (AC): (Following landmarks should be visible:)
  - Fetal Stomach
  - Umbilical vein
  - Portal sinus


Umbilical vein
Fetal stomach
Portal sinus
Vertebral body and ribs

plane for measuring AC



1. Ratio (Age independent):

a) $\dfrac{\text{Head circumference}}{\text{Abdominal circumference}}$

Normally in Pregnancy

→ As pregnancy advances ; AC ↑

$\therefore \dfrac{HC}{AC} = \downarrow$

In case of IUGR (asymmetric)

HC = Normal

AC = ↓

$\therefore \dfrac{HC}{AC} = \uparrow$

- a) $\dfrac{\text{Femur length}}{\text{Abdominal circumference}}$ = normal - 22%

- In case of asymmetric IUGR :

FL = N

AC = ↓

$\dfrac{FL}{AC} = \uparrow$ (≥ 23.5%)

- In asymmetric IUGR :

Blood flow ↓(fetus)

↓

Renal Blood flow ↓

↓

GFR ↓

↓

Urine output ↓

↓

Oligohydramnios

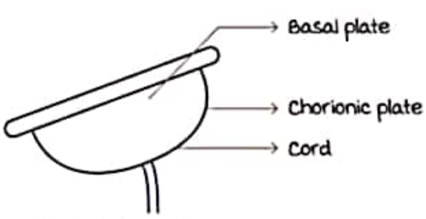
Active space

3. On USG: Amniotic Fluid Volume

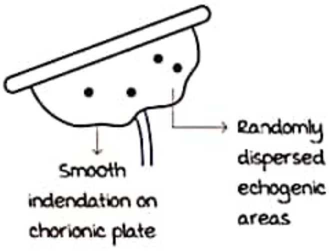
Amniotic Fluid Index → < 5 cm → Oligohydramnios

Single largest vertical pocket → < 2 cm → Oligohydramnios

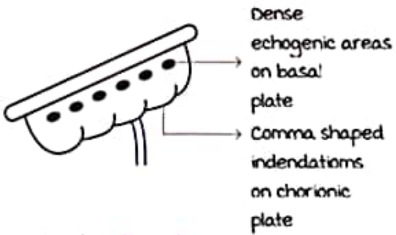
4. Placental morphology


Basal plate
Chorionic plate
Cord

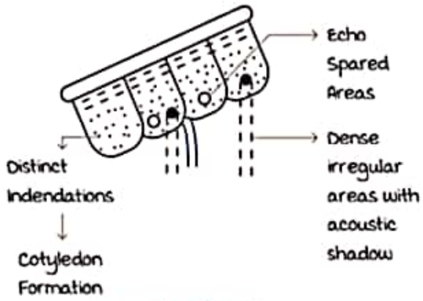
Grade 0 placenta


Smooth indendation on chorionic plate
Randomly dispersed echogenic areas

Grade 1 Placenta


Dense echogenic areas on basal plate
Comma shaped indendations on chorionic plate

Grade 2 Placenta


Echo Spared Areas
Dense irregular areas with acoustic shadow
Distinct Indendations
Cotyledon Formation

Grade 3 Placenta

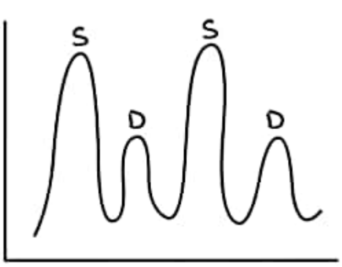
Umbilical artery doppler 00:46:17

Best way to assess IUGR: Doppler

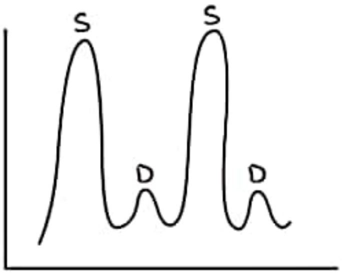
1st change: Amniotic fluid index

+

Umbilical Artery Doppler



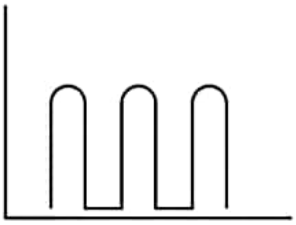
Normal ; S/D = ↓



IUGR / PIH ; S/D = ↑

S → Systolic

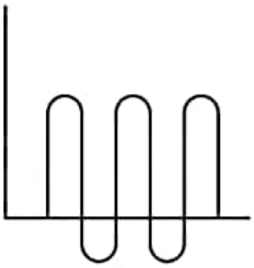
D → Diastolic



Absent end diastolic flow

↓

terminate pregnancy @ 34 weeks



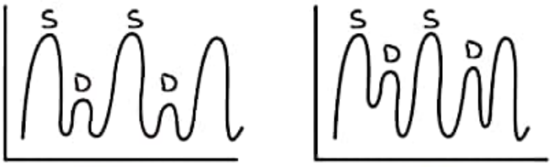
Reverse diastolic flow

↓

Immediately terminate Pregnancy

Middle cerebral artery and ductus venosus doppler 00:51:28

2^{nd} change: middle Cerebral Artery



Normal

IUGR (asymmetric)

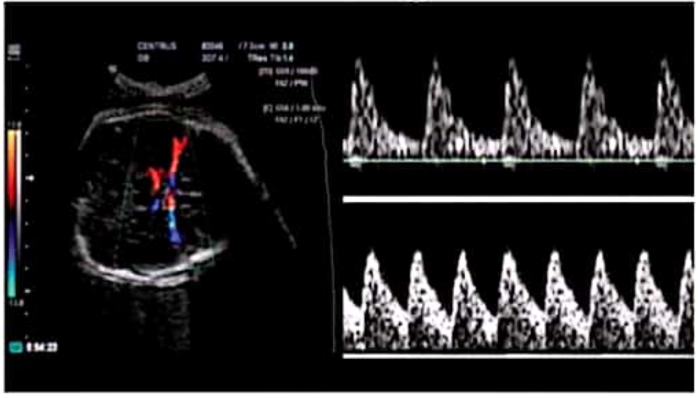
→ ↑ Blood flow during diastole

→ S/D = ↓

IUGR

- S/D ratio in umbilical artery: ↑
- S/D ratio in MCA: ↓

middle cerebral artery waveform



Color doppler examination of the circle of willis (left). Flow velocity waveforms from the middle cerebral artery in a normal fetus with low diastolic velocities (right, top) and in a growth-restricted fetus with high diastolic velocities (right, bottom)

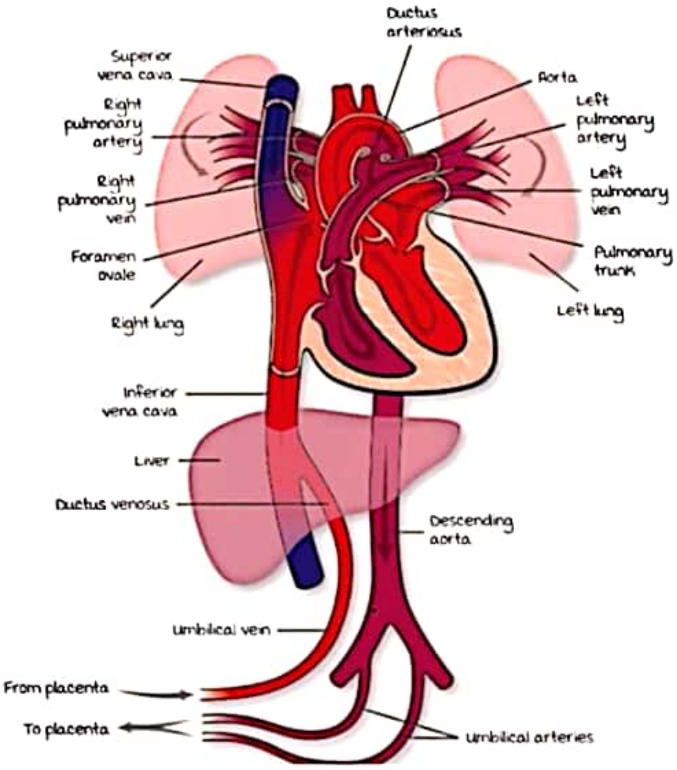
3rd Artery: Ductus venosus

↓

Flow to IVC ↓

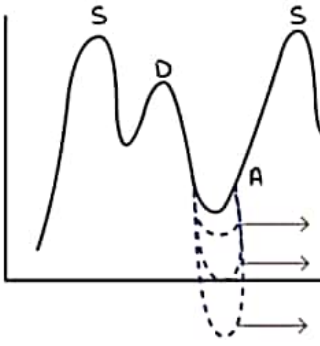
↓

↓ Blood in Ductus Venosus


Ductus arteriosus
Superior vena cava
Aorta
Right pulmonary artery
Left pulmonary artery
Right pulmonary vein
Left pulmonary vein
Foramen ovale
Pulmonary trunk
Right lung
Left lung
Inferior vena cava
Liver
Ductus venosus
Descending aorta
Umbilical vein
From placenta
To placenta
Umbilical arteries

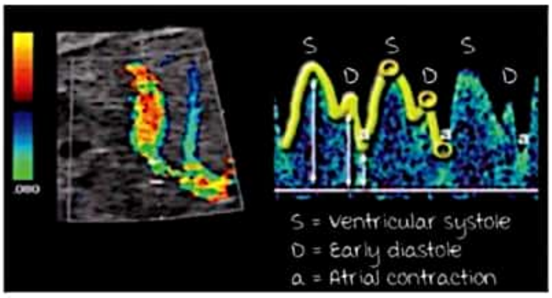
Fetal circulation

- Doppler of Ductus Venosus :



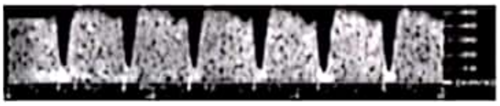
s- ventricular systole
d- ventricuar diastole
a - atrial systole

→ 1. Decreased blood in atrial systole
→ 2. Absent blood in atrial systole
→ 3. In atrial systole

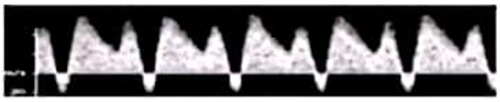

S
S
S
D
D
D
a
a
a
.080
S = ventricular systole
D = Early diastole
a = Atrial contraction

Normal Waveform

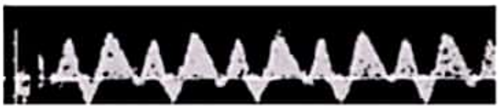
- Abnormal ductus venosus waveform



→ ↓ Blood flow in atrial systole



→ Reversal of blood flow



→ Reversal of blood flow :

Atrial Systole
+
Ventricular diastole

Problems in IUGR

01:02:26

1. Oligohydramnios

↓

↓ space in uterus

↓

Cord of body gets compressed

↓

Fetal distress

↓

Fetus passes meconium in amniotic fluid

↓

Fetus swallows meconium stained amniotic fluid

↓

2. Meconium Aspiration Syndrome
3. Low Birth Weight
4. Fetal distress / Hypoxia / Acidosis
5. Still birth

- Neonate :
  - Loose Skin
  - ↓ Tone
  - ↑ Hyaline membrane Disease / Respiratory Distress Syndrome
  - ↑ Intraventricular Hemorrhage
  - ↑ Neonatal Death

Fetal surveillance in IUGR:

- Non - Stress Test → bi weekly
- Management

  (i) No Role of :

    1. Ca
    2. Mg
    3. Zn
    4. Anti oxidants
    5. Vit C , Vit E
    6. High Protein Diet (Exception: If pregnant female is malnourished)

Active space

ABORTION

Introduction 00:00:10

- Pregnancy loss before period of viability

  Or

  Pregnancy loss at < 20 weeks of gestation
- Period of viability:

  USA = 20 weeks

  India = 28 wks

  WHO = 24 wks
- weight of fetus at 20 weeks – 300 grams
- WHO definition

  "Pregnancy loss with weight of fetus < 500 grams"

  (at 24 weeks of pregnancy)

Classification of abortion 00:03:17

USG Criteria:

- Blighted ovum
  - If gestation sac is visible but no yolk sac, no fetal pole and no cardiac activity
    - Mean Sac Diameter ≥ 25mm
      No yolk sac
      No fetal pole
      No cardiac activity
- missed abortion
  - Gestational sac and yolk sac present fetal tissue identified no cardiac activity
    - Crown Rump Length ≥ 7 mm
      No cardiac activity

Abortion

- Spontaneous (isolated)
- Induced (MTP)
- Recurrent
  ≥ 3 pregnancy loss
  (Investigation should begin at ≥ 2 abortions)

Spontaneous abortion

00:07:16

- mc cause of isolated spontaneous abortion – Chromosomal abnormality

(germplasm defect)
(fetal cause)

1st trimester ↓ 50%

2nd trimester ↓ 35%

- mc time of spontaneous abortion < 8 weeks
- mc chromosomal defect for abortion:

  Best answer : Aneuploidy
  2nd best : Trisomy
  3rd best : monosomy X (20%)
  4th best : Trisomy 16 (16%)

- most lethal trisomy – Trisomy 16
- most viable trisomy – Trisomy 21

mc sex chromosome abnormality – Klinefelter's syndrome ↓ (1 in 1000 pregnancy)

2nd mc sex chromosome abnormality – Turner's syndrome (1 in 2500 pregnancy)

- most important risk factor for spontaneous abortion
  - Best : maternal age
  - 2nd best : Previous history of abortion
- Previous history of

  1 abortion = 20% risk of recurrence
  2 abortions = 30% risk
  3 abortions = 40–50%

- Infections can lead to single episode of abortion
- mc time for abortion = 1st trimester (< 8 weeks)

Active space

Recurrent abortions 00:14:30

Causes:

1. Uterine causes (mc) (10-15%)

↓

Congenital causes | Acquired causes

Congenital causes
↓
→ Uterine malformation
↓
(mc - septate uterus)

Acquired causes
↓
① Cervical incompetence (mc)
② Fibroid
③ Endometrial polyp

→ Uterine causes lead to 2nd trimester recurrent pregnancy loss
↓
Investigation
↓

Pregnant
↓
"TVS"
(diagnose cervical incompetency)

Not pregnant (screening test)
① HSG
② Saline infusion sonography
③ Hysteroscopy
④ Laparoscopy

Causes for recurrent abortion 00:19:10

2. Anti phospholipid Antibody syndrome: (5-15%)

- Investigations:
- Antibodies:
  - Lupus Anticoagulant
  - Anti cardiolipin Ab
  - Anti β_2 microglobulin Ab

3. Chromosomal abnormality
↓
Balanced translocation of chromosomes

Investigation: Karyotyping

4. Hypothyroidism
↓
TSH levels

Probable causes of Recurrent Pregnancy Loss(RPL):

1. Diabetes
2. Increased prolactin levels
3. Luteal phase defect:
↓
In pregnant female progesterone level < 5 ng

Infections:

- Never lead to recurrent pregnancy loss
↓
Except: Syphilis
↓
"Kassowitz law"

" As number of pregnancy losses increase,
the period at which the pregnancy ends also increase"

- Syphilis does not lead to Early recurrent pregnancy loss
- Investigation: VDRL test

Investigations: No role in recurrent pregnancy loss

1. TORCH test
2. Serum progesterone levels

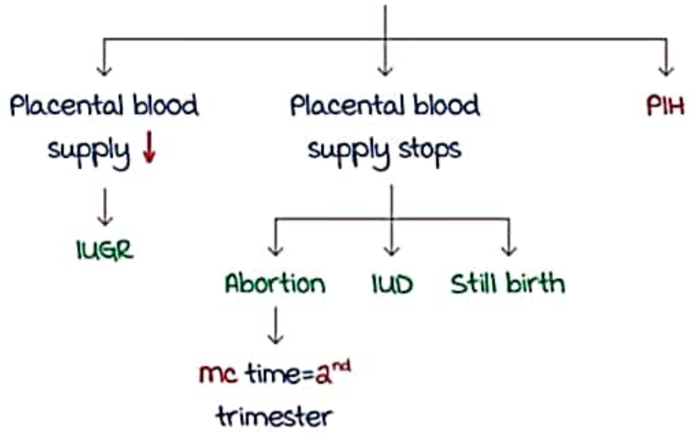
- MC cause of Recurrent pregnancy loss – uterine causes (10–15%) > AP
- Anti phospholipid syndrome – several auto immune diseases have been linked to poor obstetric out comes

But it is the only immune condition in which pregnancy loss is a diagnostic criteria for the disease

- 5–15% of patients with recurrent pregnancy loss may have Antiphospholipid syndrome
- MCC immunological cause for RPL : APLA
- MC cause of 1st trimester recurrent abortions – Idiopathic abortions
- MCC of 2nd trimester recurrent abortions – uterine causes

Anti-Phospholipid Antibody syndrome (APLA) 00: 28: 19

- Antibodies are present
- MC antibodies:
  1. Lupus anti coagulant (misnomer)
  2. Anti cardiolipin Ab
  3. Ab against β_2 Glycoprotein 1
- APLA leads to both arterial and venous thrombosis in placental blood vessels


Placental blood supply ↓
IUGR
Placental blood supply stops
Abortion
mc time=2nd trimester
IUD
Still birth
PIH

- Size of placenta reduces – uteroplacental insufficiency

Diagnosis of APLA 00:32:53

Revised / modified sapporo criteria

(Earlier 1 clinical + 2 lab, now 1 lab + 1 clinical)

Clinical:

1. Arterial / venous Thrombosis (superficial / deep)
2. ≥ 3 losses in < 10 weeks (recurrent losses)
3. ≥ 1 loss in > 10 weeks of morphologically normal fetus
4. Atleast 1 preterm delivery secondary to severe PIH/ Uteroplacental insufficiency

Lab criteria:

1. Presence of lupus anticoagulant Ab
2. Presence of Igm/IgG anticoagulant Ab
3. Presence of β_2 micro globulin Ab

} on 2 occasions, 12 weeks apart

- In APLA:
  APTT prolonged
  PT – normal

- 'Russel viper venom' clotting time – prolonged

Management of APLA

00:37:15

- Aspirin (low dose) = 50–100 mg (80 mg)

APLA diagnosed based on history of Abortion

↓

Aspirin
↓
Started as UPT +ve
↓
Through out pregnancy
↓
Stopped 4–6 days before labour

Heparin
↓
(LMWH > unfractionated heparin)
↓
Started only after confirming it is intra-uterine pregnancy
↓
Continued throughout pregnancy
↓
Stopped at onset of labour

APLA is diagnosed based on criteria of PTL (preterm labour)

Give only: Aspirin
↓
Time: at end of 1st trimester
↓
Continue throughout pregnancy

- DOC for management of APLA – Warfarin

  DOC for management of APLA in pregnancy – Aspirin

Warfarin

00:43:32

- Contraindicated in pregnancy
- Reason: It can cross placenta

Limit vitamin K activity in fetus
↓

↓

Osteocalcin needs vitamin K for carboxylation

↓

Bone and cartilage deformity

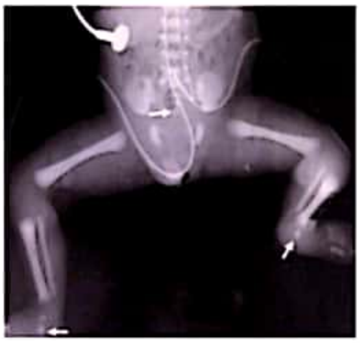
↓ Warfarin embryopathy

1. Stippled epiphysis
2. Nasal hypoplasia
3. Limp hypoplasia

↓

Resembles "chondrodysplasia punctata" (X linked disease)

Warfarin embryopathy



Cervical incompetence

00:47:58

- M/C/Cause of 2nd trimester recurrent pregnancy loss
- Painless, sudden dilatation of Internal OS

↓ (2nd trimester)

Rupture of membranes → Expulsion of fetus

Etiology:

Congenital

Acquired (most commonly)
① Forcible dilatation of cervix (D&C)
② Cervical surgeries (least chances-cryosurgery)

Active space

Diagnosis:

Non pregnant

↓

→ History
① Recurrent pregnancy loss
② Only of 2nd trimester
③ Painless dilatation of cervix
④ Number of losses ↑

↓

POG at which loss occurs ↓

→ Hegar's Dilation:
If No. 8 Hegar's dilator
can be passed

↓

Through internal OS

↓

without patient offering
any resistance

Pregnant

↓

TVS

↓

Cervical length

① Length of cervix = < 2
② Dilatation = > 2 cm
③ Shape of cervix on
USG = U shaped

→ Normally cervix is "T shaped"

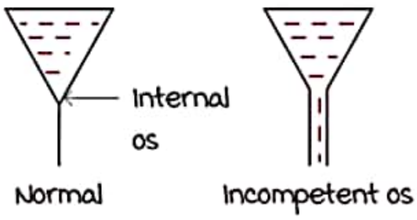
↓

As cervix dilates – "Y shaped"

↓

" U shaped"

- Hystero cervicography



↓

"Funnel shaped
appearance"

Management 00:55:45

Cervical cerclage (vaginally) – mc

↓ mc Donald cordage (mc)

↓

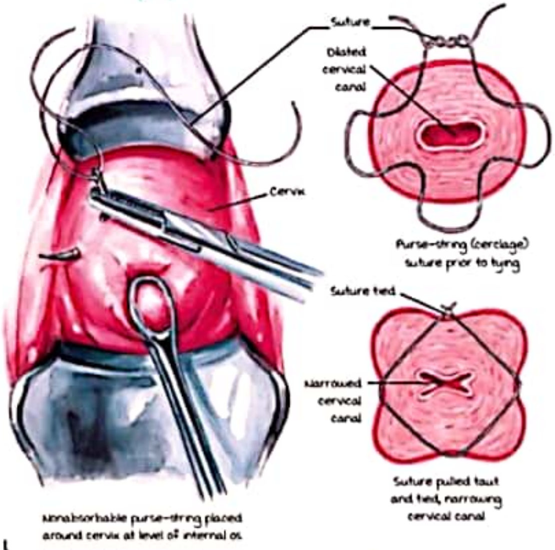
Purse string suture around internal OS

↓ Shirodkar cerclage

↓

mersilene tape is used

– Not common method


Suture
Dilated cervical canal
Cervix
Purse-string (cerclage) suture prior to tying
Suture tied
Narrowed cervical canal
Suture pulled taut and tied, narrowing cervical canal
Nonabsorbable purse-string placed around cervix at level of internal os

Fails

↓

Abdominal cerclage: "Bensen and Durfee cerclage"

Indications for cervical cerclage 00: 58: 22

1. History based Indications:
    - Recurrent abortions of 2nd trimester (≥ 3)
    - History of preterm labour
2. USG based Indication
    - Length of cervix < 2.5cms

(+)

Patient given history of ≥1 2nd trimester abortion

- Emergency / Rescue cerclage

↓

Cervix has begun dilating and then cervix cerclage

↓

Dilatation < 4 cm and membranes should not be ruptured

- Time for cerclage – 14-24 weeks (12-14 weeks)
  - Cannot do after 24 weeks
- Time to remove suture – 37 weeks of pregnancy
  or
  at the onset of labour
- Earlier removal – Rupture of membrane, preterm labour, fetal distress

Contraindications for cerclage 01:04:10

1. Dilatation of cervix ≥ 4cms
2. membranes are ruptured
3. Presence of gross anomaly of fetus
4. Vaginal bleeding present
5. Presence of pelvic infections
6. Placenta previa (relative contra indication)

Types of abortion 01:05:30

Types	Definition	Symptoms	P/A examination	Internal OS	USG
1. Threatened abortion	Process of abortion has begun but it is at a stage from where it can be reversed	Spotting PV	Height of uterus = period of gestation	Closed	Live fetus – cardiac activity present

POC – products of consumption

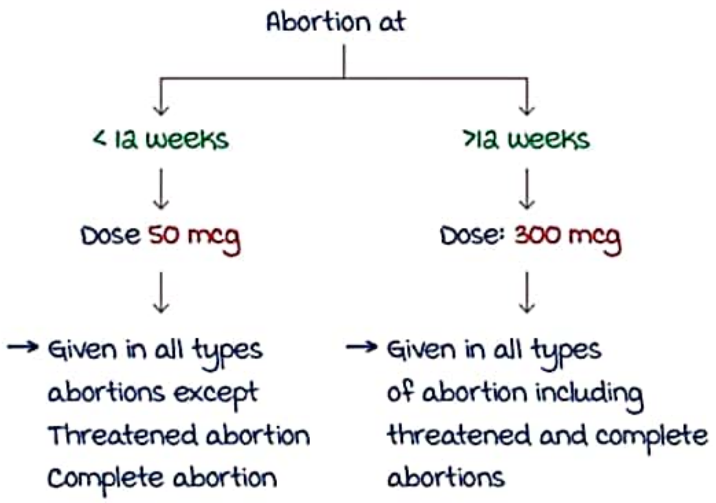
2. Inevitable abortion	Cannot be reversed (POC has not started coming out)	Bleeding +/− pain in abdomen	Ht of uterus = period of gestation	Open	Dead fetus No cardiac activity
3. Incomplete abortion	POC has started coming out but process is not yet complete	c/o = POC coming out + bleeding + pain in abdomen	Ht of uterus less than pd of gestation	Open + POC can be seen coming out through it	Incomplete product of conception
4. Complete abortion	Entire process of abortion is complete on its own	initially = bleeding + pain + product of conception comes out → Bleeding stops	Height of uterus less than period of gestation	Closed	Empty uterus
5. Missed abortion	Fetus dead but patient is unaware	brownish vaginal discharge	Ht of uterus less than pd of gestation	Closed	Dead macerated fetus or CRL > 7 mm, no cardiac activity

Active space

Anti-D prophylaxis in RH-negative

01:16:30

Female who has had abortion:


Abortion at
< 12 weeks
>12 weeks
Dose 50 mcg
Dose: 300 mcg
→ Given in all types abortions except Threatened abortion Complete abortion
→ Given in all types of abortion including threatened and complete abortions

Active space

MEDICAL TERMINATION OF PREGNANCY (MTP)

MTP ACT 00:00:16

- MTP act was passed in 1971
- Came into action in 1972
- MTP can be done only upto 20 weeks of pregnancy
- If MTP done at
  - < 12 weeks → Single doctor opinion
  - ≥ 12 weeks → Two doctors opinion needed

- Consent for MTP
  - If the female ≥ 18 yrs
    - Her consent needed (written)
    - Husband's consent not required
  - If the female < 18 yrs / not mentally sound
    - Written consent from Parents / guardians

- MTP can be done by
  - MBBS Doctor
    - Assisted atleast 25 cases of MTP
    - Resident in Obstetrics and gynaecology for 6 months
  - Degree in gynaecology / Diploma in gynaecology & Obstetrics

- MTP can be done in
  - Government hospitals
  - Private centres approved by the government

Active space

Indications of MTP

00:04:49

- Maternal
  - Clark's class III heart disease
  - Chronic renal disease
  - Malignant hypertension
  - Psychiatric illness
    - Schizophrenia
- Fetal
  - Radiation exposure
  - Teratogenic Drug exposure
  - Rubella infection
    - Congenital Rubella Syndrome
      - mental retardation
      - Sensorineural hearing loss
      - microcephaly
      - micropthalmia
      - Congenital cataract
      - Congenital heart disease (PDA)
- Humanitarian
  - Rape
- Social ground
  - Low socio economical status
  - Failure of contraception

- methods of MTP
  - 1st trimester methods
  - 2nd trimester methods

- First trimester methods
  - medical abortion
    - misoprost } m.c used
    - mifeprostone } m.c used
    - methotrexate
  - menstrual regulation
    - Done using menstrual regulation Syringe
  - Suction evacuation
    - Done using Karman Canula
  - manual Vaccum aspiration
  - Dilation & Curettage

MTP - Second trimester methods 00:08:35

- Prostaglandins (PG)
  - PGF - 2α - Carboprost - IM
  - PGE 2 - Dinoprost
  - PGE 1 - misoprost
  - PGE 2 analogue - Gemeprost
- Suction evacuation
- Extra amniotic ethacridine
  - 0.1 %
- Intra amniotic instillation of hypertonic solution
  - Urea,
  - mannitol,
  - Hypertonic saline
- Hysterotomy

Best method of doing MTP

Period of pregnancy	method
≤ 7 weeks	medical abortion
7- 15 weeks	Suction Evacuation
≥ 15 weeks	Prostaglandins

Medical abortion 00:12:34

- WHO / ACOG recommendation - medical abortion can be done upto 9 weeks (63 days)

  In India - medical abortion done only upto 7 weeks (49 days)

- Before initiating medical abortion

  ↓

  - Intrauterine pregnancy should be confirmed on ultrasound
  - Patient should be compliant to follow up / Abortion

Protocol for medical abortion at < 7 weeks and 7 - 9 weeks 00:15:01

At < 7 weeks

- On Day 1 - oral mifepristone - 200 mg (1 tablet)

  ↓

  RU 486 / anti progesterone compound - Kills the fetus

- On Day 3 – 400 mcg (2 tablets) of misoprost (vaginally or orally)

Teratogenic
↓
Contraindicated during surgery
↓
Moebius syndrome

It is PGE 1
↓
Causes uterine contraction
↓
Expels dead fetus

- Within 2 to 3 days the patient will experience heavy bleeding
- On Day 15 – To ensure that the process of abortion is complete
- In 99% – abortion will be complete
- In 1% – abortion is not complete

↓

Dilation & curettage to complete it

At 7 – 9 weeks

- On Day 1 – Oral mifepristone – 200 mg
- On Day 3 – 800 mcg (4 tablets) of vaginal misoprost
- On Day 15 – To ensure the process of abortion is complete
- Success rate – 95%

Suction evacuation 00:20:30

- It is done using plastic cannula – Karman cannula

- 4 – 12 number is written on cannula

↓

  - Indicates the diameter of cannula in millimeter
  - The number of Karman cannula – corresponds to the week of Pregnancy or it should be 1 less

- The canula is attached to suction machine

↓

Generates 600 mm of Hg pressure – sucks the fetal parts

- Before passing Karman cannula – the internal os dilated

  ↓

  Using Hegor dilator

- Complication – uterine perforation

  Occurs while dilating internal os

  ↓

  Wait & watch

  While doing suction evacuation

  ↓

  Serious injury

  ↓

  Let the cannula remain inside

  ↓

  Patient should be taken for Laparotomy immediately

Menstrual regulation

00:27:07

- Done within 3 weeks after a missed period i.e 7 weeks of amenorrhea using a 50 ml syringe

- In rural areas – manual vaccum aspiration

  ↓

  Using 60 ml syringe and 6 – 12 mm cannula
  Pressure of 660 mm of Hg
  Used up till 12 weeks
  Doesn't require electricity – best for rural settings

Prostaglandins

00:30:51

- Done in 2nd trimester (beyond 15 weeks)

Analogue	Name	Route	Dose	Maximum dose
PGF - 2α	Carboprost	IM	250 mcg (3 - 4hrly)	10 doses
PGE 1	Gemeprost	Vaginal pessary	1 mg (3- 4 hrly)	5 doses
PGE 1	Misoprost	Oral/ vaginal tablet	200 mcg to 800 mcg (3 - 4 hrly)	4 doses
PGE 2	Dinoprost	Vaginal pessary	20 mg	

Extra amniotic Ethacridine

00:34:06

- A Foley's catheter is placed in between the membrane & uterus

Through Foley's - Pass ethacridine (0.1%)

↓

Dose - 10ml x weeks of gestation
Maximum - 150 ml
Foley's catheter left for - 4 - 6 hrs

- Abortion begins by - 12 - 48 hrs - Separates membrane from uterus

↓

releases prostaglandins

↓

initiates uterine contraction

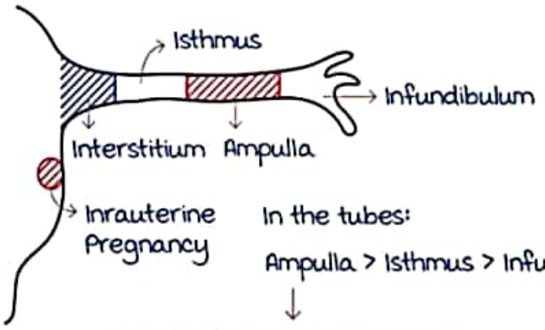
↓

abortion

INTRODUCTION AND MANAGEMENT OF RUPTURED ECTOPIC PREGNANCY

Ectopic pregnancy 00:00:19

- Implantation occurs outside uterus
- Ectopic pregnancy
  - m.c Site (overall) → Fallopian tube
  - m.c Non tubal site → Ovary
  - Overall least common site → Ectopic in cesarean 0.1% Or Cervical ectopic 0.1%



In the tubes:

Ampulla > Isthmus > Infundibulum > Interstitial

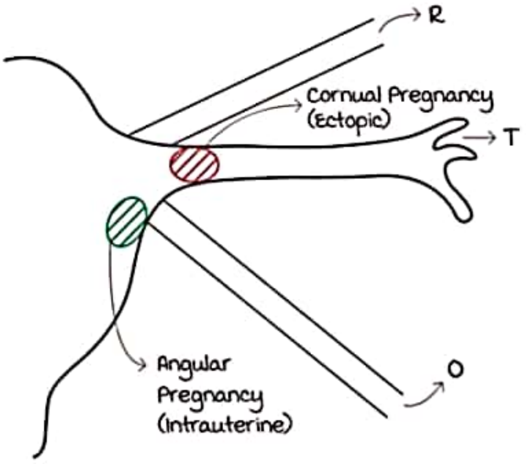
Ampulla ↓ mc site for ectopic pregnancy (Fertilization)

Interstitial ↓ Least common

- Least common site of Ectopic pregnancy → Cervical ectopic / ectopic in cesarean scar
- Least common site of Ectopic in tubes → Interstitial

Cornual pregnancy and intrauterine pregnancy 00:05:49

- Cornual pregnancy
  - Ectopic pregnancy which occurs in interstitial / Rudimentary horn of a bicornuate uterus
- Intrauterine pregnancy
  - Close to the angles of uterus
  - AKA Angular pregnancy



- Anterior to posterior:
  Structures attached to angle / cornua of uterus → RTO

R → Round Ligament
T → Fallopian tube
O → Ovarian Ligament

- Cornual pregnancy: Embryo lies lateral to Round ligament
- Angular pregnancy: Embryo lies medial to Round ligament
- Outcome of ectopic pregnancy:

Abort ↓ Tubal Abortion
→ Ampulla
→ Infundibulum
} m.c sites
m.c: Ampulla > Interstitium

Continues to grow ↓ Tubal rupture
→ Isthmus
→ Interstitial
} m.c sites
m.c: Isthmus > Interstitium

Important points

00:15:17

Ectopic pregnancy

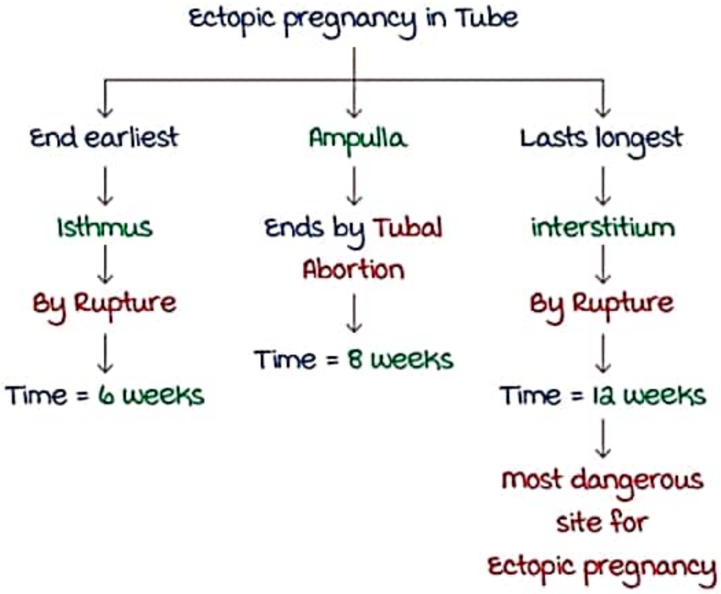
Ends earliest ↓ Isthmus

Lasts longest in fallopian tube ↓ Interstitium (myometrium of uterus supports pregnancy at this site)

Lasts longest overall ↓
→ Abdominal Ectopic
→ Heterotopic pregnancy
- Twin pregnancy:
  1st pregnancy → Intrauterine
  2nd pregnancy → Ectopic

Narrowest part of the tube – Interstitium

2nd narrowest part of the tube – Isthmus


Ectopic pregnancy in Tube
End earliest
Isthmus
By Rupture
Time = 6 weeks
Ampulla
Ends by Tubal Abortion
Time = 8 weeks
Lasts longest
interstitium
By Rupture
Time = 12 weeks
most dangerous site for Ectopic pregnancy

Risk factors for ectopic pregnancy 00:20:30

1. Highest risk of Ectopic pregnancy:

   Previous history of ectopic pregnancy > tubal surgery

- Chance of Recurrence :
  - If History of previous one episode: 15% Of Ectopic pregnancy
  - In previous 2 episodes: 30%

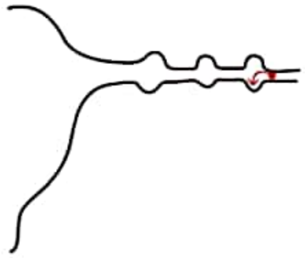
2. M.C Risk factor: Salpingitis /PID
   - PID includes:
     Salpingitis
     Oophoritis
     Endometritis

3. Other Risk factors: IVF /ART
4. Smoking
5. Early age of intercourse
6. Multiple sex partners

} → Risk factors for PID (sexually transmitted)

7. Low socio-economic status
8. Any adhesions inside tube:
   - Endometriosis / Appendicitis
   - Theory of Retrograde menstruation

1. Salpingitis isthmica nodosa



→ zygote can fall in one of the pockets of fallopian tube and implant there

Role of contraceptive agents in ectopic pregnancy 00:26:47

- ↓ the absolute risk of ectopic pregnancy (↓overall chance of any type of pregnancy
- But on failure → ↑ chance of ectopic pregnancy
- m.c: Tubectomy > IUCD > POP (progesterone only pills)

↓

Progestasert > MIRENA > Cu IUCD

- Least chance: OCP and with vasectomy failure

Symptoms of ectopic pregnancy 00:29:44

- most consistent symptom of ectopic pregnancy

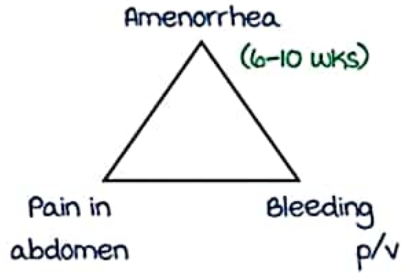
Pain in abdomen

Ruptured ectopic pregnancy
↓
Hemo peritoneum
↓
Irritates Diaphragm
↓
Shoulder tip pain
(AKA: Danforth sign)

Unruptured ectopic pregnancy
↓
Stretching of fallopian tube

Active space

- In 50% cases: Triad

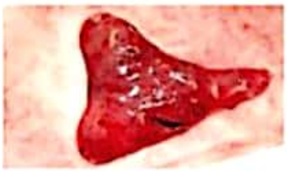


- 2 reactions brought by progesterone during pregnancy:

↓ Converts endometrium into decidua
↓ Decidual Reaction
↓ Seen in intrauterine and ectopic Pregnancy

↓ Arias Stella Reaction
↓ Characterized by:
→ Enlarged glands in endometrium
→ abundant cytoplasm
→ Hobnail Nucleus
↓ Seen in:
- Intrauterine pregnancy
- Ectopic pregnancy
- molar pregnancy

- In patients of ectopic pregnancy:
↓ Progesterone is present (less amount)
↓ Decidua is shed in the form of Decidua cast
↓ made of Decidua vera



- Signs:
1. Decidua cast
2. Cervical motion tenderness
   → Differential diagnosis : PID
3. Presence of Adnexal mass

Diagnosis and management of ruptured ectopic pregnancy

00:37:03

Diagnosis:

- Clinical Diagnosis
- Complains of: Amenorrhea (6-10 weeks) + Pain in abdomen + Shock +/− Bleeding P/V } Urine pregnancy test positive

Ruptured Ectopic pregnancy

Management:

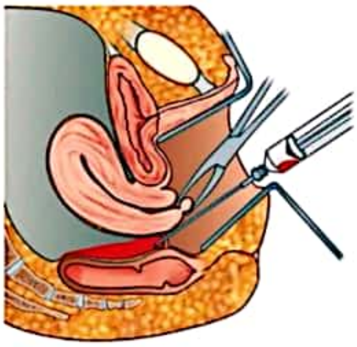
Laparotomy (Preferred)
↳ Vitals unstable

Laparoscopy
↓
Can be done only if vitals of patient are stable

- Surgery of choice: Ruptured Ectopic
  ↓
  Remove the tube which is damaged
  ↓
  Salpingectomy
  (Whether female is nulliparous or multiparous
- Following are not done in ruptured ectopic
  1. Medical management
  2. Expectant management
  3. Any other surgery except salpingectomy
- Salpingo Oophorectomy is never done in ectopic pregnancy
  (Tubes are removed in ruptured ectopic, ovaries retained)

Culdocentesis

- A needle is passed via posterior fornix
- Non clotting blood → Hemoperitoneum
- Blood which clots → Needle pierced an artery



- Doesn't confirm if its ruptured ectopic pregnancy

MANAGEMENT OF UNRUPTURED ECTOPIC PREGNANCY AND SALPINGECTOMY

Diagnosis of unruptured ectopic 00:00:13

IOC: TVS (Transvaginal USG)

1) Empty uterus
(1st sign: indicates ectopic pregnancy)
2) Pseudo gestational sac

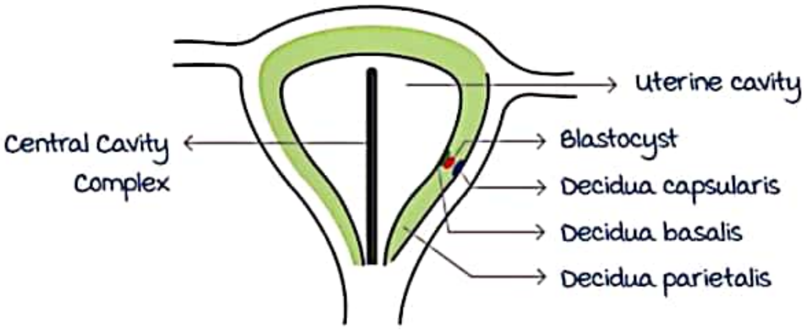
Tubes & Adnexa
1) Gestational sac or cardiac activity in tubes
↓
"Bagels sign"
↓
Confirm- Doppler
↓
"Ring of fire appearance"
2) Complex adnexal mass

Decidua 00:04:46

Decidua basalis
↓
Separates blastocyst from myometrium
↓
Forms maternal side of Placenta

Decidua capsularis
↓
Separates blastocyst from uterine cavity

Decidua parietalis
↓
Rest of decidua


Uterine cavity
Central Cavity Complex
Blastocyst
Decidua capsularis
Decidua basalis
Decidua parietalis

Intra - decidual sign on USG: 00:06:22

- In early pregnancy as the blastocyst / gestational sac implants in the decidua

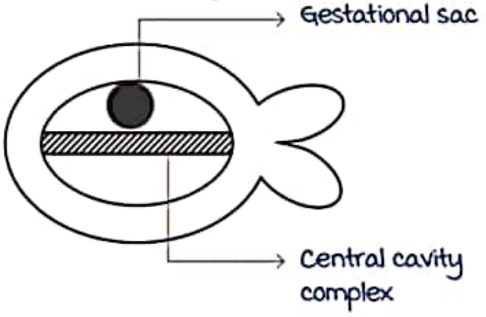
↓

If Interstitial implantation occurs and does not displace / deform the hyper echogenic central cavity complex

↓

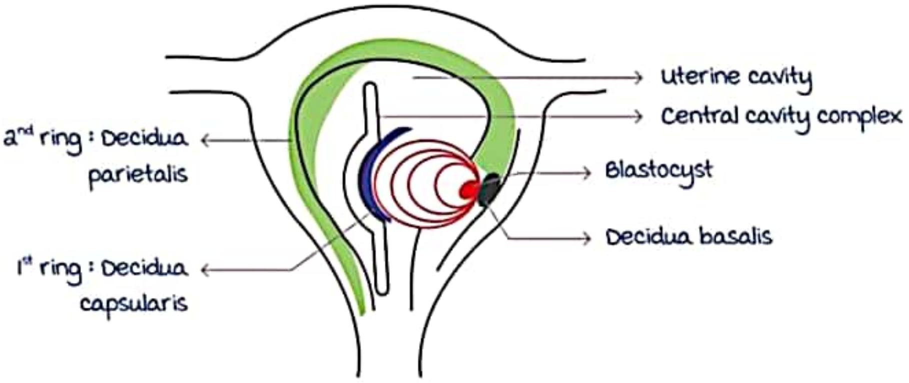
Called as "Intra decidual sign"

Intra decidual sign:

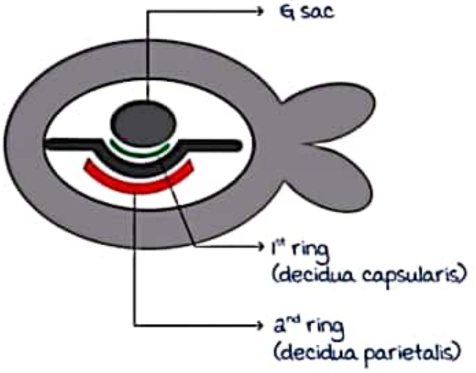

Gestational sac
Central cavity complex

Double decidual sac sign 00:08:36

Seen only in intra-uterine pregnancy


Uterine cavity
Central cavity complex
2nd ring : Decidua parietalis
Blastocyst
Decidua basalis
1st ring : Decidua capsularis

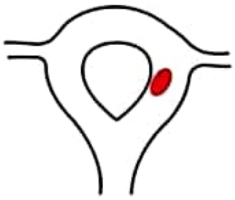
Double decidual sac sign:


G sac
1st ring (decidua capsularis)
2nd ring (decidua parietalis)

Difference between true and pseudogestational sac 00:12:43

True gestational sac

→ seen in intrauterine pregnancy



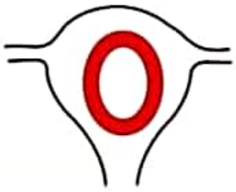
→ Eccentric in location

→ ↑ in size (1-3mm/day)

→ Double decidual sign/ Double ring sign (+)

Pseudogestational sac

→ seen in Ectopic pregnancy



→ Thick decidua

→ Centrally located

→ Size remains constant

→ Double ring sign (–)

TVS findings in unruptured ectopic pregnancy 00:15:47

Emtpy uterine cavity

↓ Early Intrauterine Pregnancy

↓ Abortion

↓ Ectopic pregnancy

β hcg levels measured

Critical titre of hCG:

- Value of hCG at which gestational sac should be visible on USG (TVS)

TVS = 1500 IU/L (1000-2000)

TAS = 6500 IU/L (> 5000)

↓

"β HCG levels"

↓ ≥ 1500 IU

Ectopic pregnancy

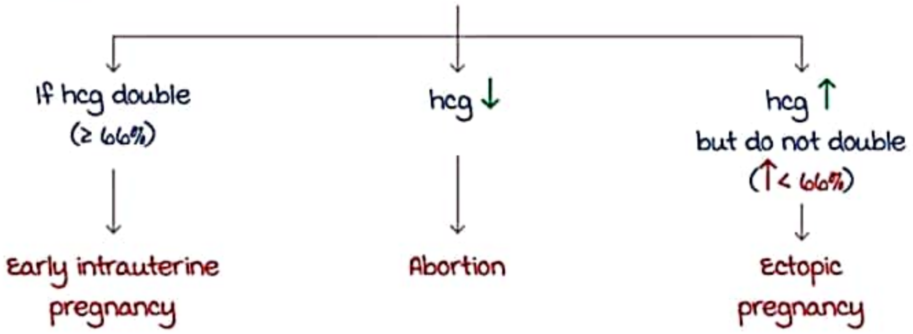
↓ < 1500 IU

↓

Repeat βhcg after 48 hrs

Active space

In a intrauterine pregnancy β hCG levels roughly double in 48 hrs (≥ 66%)


If hcg double
(≥ 66%)
Early intrauterine pregnancy
hcg ↓
Abortion
hcg ↑
but do not double
(↑< 66%)
Ectopic pregnancy

Other investigations

00:23:32

1. Serum progesterone levels:
   - ≥ 25 ng/ml → Intra uterine viable pregnancy
   - < 5 ng/ml → During pregnancy (abortion / ectopic)

→ IOC: TVS

Best: TVS + β hcg

Gold standard: Laparoscopy

Investigations not done in ectopic pregnancy:

1. HSG
2. Hysteroscopy
3. Colpotomy- For draining pelvic abscess

Management of unruptured ectopic 00:26:58

1. Expectant management	2. medical management	3. Surgical management
↓	↓	↓
Wait and watch	management of choice	• Laparoscopy (preferred) • Laparotomy
- Risk of rupture - Not preferred	- Preferred in case of unruptured ectopic pregnancy DOC: methotrexate	

Pre-requisites

1. Only in unruptured ectopic pregnancy
2. Hemodynamically stable patients

→ Conditions:	→ Conditions:
- Size of ectopic <3cm	- Size of ectopic <4cm
- β hCG < 1000 IU (Best= <200 IU) and decreasing	→ β hCG <5000 IU
- Cardiac activity absent	→ Cardiac activity preferrably absent

Medical management of ectopic pregnancy 00:32:58

→ DOC: methotrexate

- Single dose methotrexate

Dose: 50 mg/m^2

→ Day 1: Check βhcg of patient
Inj: methotrexate IM

Active space

→ Day 4: Repeat β hcg }
Day 7: Repeat β hcg } fall in β hcg ≥ 15%

↓

medical management is successful

→ If fall is < 15% between day 4 and 7

↓

Repeat methotrexate injection

↓

New β hcg levels recorded (Day 1,4,7)

→ Inj- methotrexate × 3times

↓

Fall is < 15%

↓

Failed medical management

↓

Surgical management

Surgical management

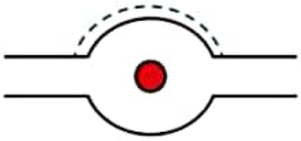
00:36:44

→ Laparoscopic surgery is preferred

→ Surgery depends on age / Parity of patient

Family not complete
↓
Linear Salpingostomy
(Preferred)

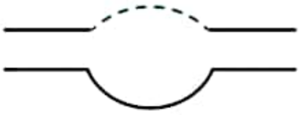
Family is complete
↓
Salpingectomy



↓

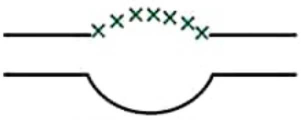
Remove ectopic by hydrodissection

↓



No suture on incision site

Similar procedure but with sutures incision site



Salpingostomy

Active space

Other sites of ectopic

00:41:17

Other sites	Criteria for diagnosis
Cervical ectopic	Palman criteria
	Rubin criteria
Abdominal ectopic	Studdiford criteria
Ovarian ectopic	Spiegelberg criteria

Indications of salpingectomy in ectopic

1. Ruptured ectopic
2. Unruptured ectopic (family is complete)
3. Size of ectopic > 5cms
4. Hemostasis cannot be maintained
5. Heterotopic pregnancy

→ Earlier : Incidence= 1 in 30,000 pregnancy
now : incidence ↑ due to ART/IVF
↓
1 In 3000 pregnancy

→ management of choice → Surgery
↓
Salpingectomy

Active space

MOLAR PREGNANCY: HYDATIDIFORM MOLE

Classification 00:00:09

molar pregnancy

- Gestational trophoblastic disease
  - Hydatidiform mole
    1. Partial mole
    2. Complete mole
- Gestational trophoblastic neoplasia
  1. Invasive mole
  2. Choriocarcinoma
  3. Placental Site Trophoblastic Tumor (PSTT)
  4. Epithelial Trophoblastic Tumor (ETT)

molar pregnancy

- molar diseases
  1. Partial mole
  2. Complete mole
  3. Invasive mole

  On HPE, Chorionic villi are present
- Rest of them
  1. Choriocarcinoma
  2. PSTT
  3. ETT

  on HPE, no chorionic villi are present

Molar pregnancy - risk factors 00:03:29

- Benign disease of the chorion with malignant potential
- more common in developing countries → Asians
- maximum incidence → Philippines
- Risk factors:
  1. Increased maternal age
     (≥ 35y → 2 times the chance
     ≥ 40y → 7 times the chance)
  2. Asian population
  3. Diet: Deficiency of vitamin A

4. Previous history : 1 molar pregnancy - 1-4% risk of recurrence
   2 molar pregnancy - 25 % risk of recurrence

5. Others: Smoking
   OCP use
   AB blood group

Molar pregnancy : pathology

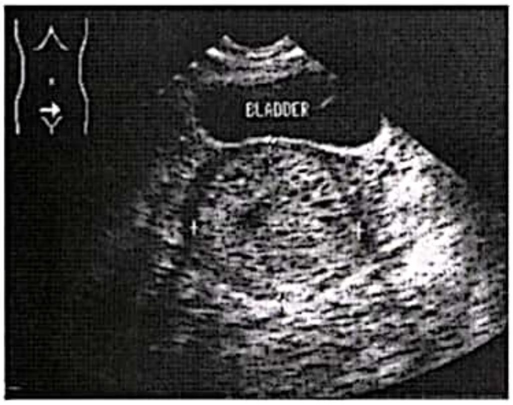
00:07:09

1) Undue proliferation of trophoblasts
   - Some fetal parts are present → Partial mole
   - No fetal parts are present → Complete mole
   - ↑ hCG levels
   - PIH
     Pregnancy induced hypertension before 20 weeks
   - ↑ Height of uterus (Height > gestational age)

2) Hydropic degeneration

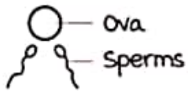
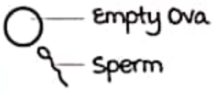
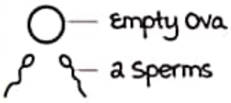
- Effect of ↑ HCG:
  1. Hyperemesis gravidarum: Excessive nausea & vomiting
  2. Thyrotoxicosis: α subunit of HCG is similar to TSH
  3. Theca lutein cysts

- On USG, Snow storm Appearance

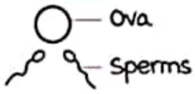
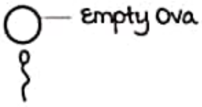


Partial mole and complete mole

00:15:01

Partial mole	complete mole
• Karyotyping: Triploid, dispermic  (69 XXX or 69 XXY) The extra genetic material is Paternal in origin	• Karyotype: Diploid, monospermic(90%)  Duplication of genetic material of sperms The entire genetic material is paternal and is Called Androgenesis In 10% cases, dispermic 
• Histopathology: - Hydropic degeneration is less - Some fetal parts are present - Trophoblastic scalloping present - Inclusion bodies present	• Histopathology: - Hydropic degeneration is more marked - No fetal parts are present - Trophoblastic scalloping and inclusion bodies are absent
• Symptoms, - most common: Bleeding p/v - expulsion of grape like vesicles - Other symptoms are less marked or absent	• Symptoms, - Similar to partial mole but all symptoms are more marked like: - PIH (27% cases) - Hyperemesis gravidarum (25%) - Thyrotoxicosis - Respiratory distress= due to embolization of Trophoblastic tissue
• Investigation - USG/TVS - Resembles missed abortion	• Investigation - USG/TVS - Snow storm appearance

Active space

• Levels of HCG ↑ but less than 10^5 IU/L	• Levels of HCG≥ 10^5 IU/L
• Theca lutein cysts are absent	• Theca lutein cysts are present
• Chances to progress to gestational trophoblastic neoplasia (GTN) 3-5 %	• Chances to progress to GTN 15-20 %
• Chances of choriocarcinoma <1%	• Chances of choriocarcinoma 4%
• Immunostaining with p57, Kip 2 → Positive ↓ (maternal gene) 	• Immunostaining with p57, Kip 2 will be negative 

- In molar pregnancy, Investigation of choice = TVS
  Investigation of choice in follow up= β HCG
  Gold standard investigations =
  Histopathological examination (HPE)

Management of molar pregnancy 00:34:18

- Treatment of choice: Suction Evacuation
  ↓
  Irrespective of gestational age of molar pregnancy
  ↓
  If required, curettage is done
  ↓
  Tissue is then sent for HPE
- Oxytocin drip should not be started before evacuation as there are chances for embolization - RCOG 2010
- Size of cannula used = 10-12
- Anti-D admininistration in all Rh —ve mothers, after evacuation
- Theca lutein cysts spontaneously regress following evacuation (Chocolate cysts in endometriosis requires laparoscopic removal)

- Indications for hysterectomy in molar pregnancy
  - Age ≥ 40y with completed family
  - Uncontrolled hemorrhage following suction evacuation
  - Invasive mole
- After suction evacuation or hysterectomy
  ↓
  Follow up with β hCG levels is must
- Hysterectomy does not decrease the risk of developing choriocarcinoma

Follow up in molar pregnancy 00:42:29

- measure β HCG weekly
  ↓
  Till 3 consecutive normal values
  ↓
  Then monthly for 6 months
- Pregnancy is contraindicated for 6 months following evacuation of molar pregnancy
  Contraception of choice – OCP: Oral contraceptive pills
- Following evacuation, β hCG levels become normal after:
  In partial mole – 7 weeks
  In complete mole – 9 weeks
- Prophylactic chemotherapy:
  - Not given to all patients after evacuation
  - Only given to high risk patients like:
    - Age ≥ 40 years
    - HCG levels ≥ 10^5 IU/L
    - Large uterine size
    - Bilateral theca lutein cysts ≥ 6cms
- Prophylactic chemotherapy, drug of choice
  methotrexate or Actinomycin D (if jaundice present)

ANTEPARTUM HEMORRHAGE

Definition:

Bleeding in or from genital tract beyond period of viability (in India – 28 weeks)

Causes

- Placental causes (m.c)
  - Abruptio placenta (m.c)
  - Placenta previa
  - Circumvallate placenta
  - Circummarginate placenta.
- Fetal causes
  - vasa previa

Placenta previa and abruption placenta

00:02:31

Placenta previa	Abruptio placenta
• Placenta in lower uterine segment	• Premature separation of normally situated Placenta
• To localize placenta → USG done In 3rd trimester	
Repeat scan done at: 36 weeks → minor degrees 32 weeks → major degrees	
Incidence:	
1 in 300 pregnancies	1 in 200 pregnancies
Recurrence rate:	
5%	12-15%
Risk factor	
Previous history of placenta previa (m.c) h/o C- section (2nd m.c)	Previous history of abruptio placenta

Active space

Common risk factors:

- multiparity
- ↑ maternal age
- Smoking
- Twin pregnancy

APH – m.c in multiparous
Smoking is a risk factor

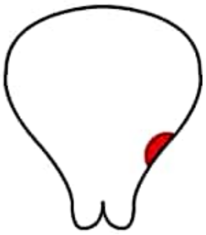
PIH – m.c in nulliparous
Smoking is protective

Other risk factors

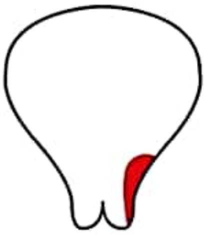
Placenta previa	Abruptio placenta
1. Placenta is big in	Cigarette smoking + cocaine
Twins	Folic acid deficiency
Diabetes	Thrombophilia
Succenturiate lobe	PIH/HTN
Placenta bilobate	Abdominal Trauma
	Fibroid
2. Defective endometrium in	PROM
Endometritis	Polyhydramnios
Smoking	Twin pregnancy
Curettage	
Previous surgery	
(C-section, myomectomy)	

Classification of placenta previa

00:17:03



Type 1: Anterior & posterior
- Placenta in lower uterine segment (LUS) (Distance from internal os <2cm)



Type 2: Placenta reaches upto margin of internal OS

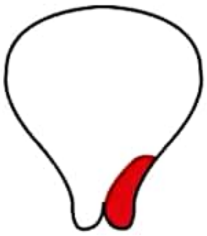
- Does not reach upto internal os

  Aka lateral / Low lying placenta previa

aka. marginal placenta previa

- Anterior & posterior types

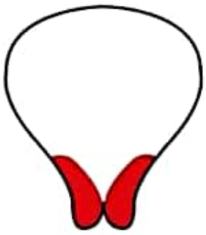
  Type 2 posterior less dangerous variety



Type 3:

- Placenta partially covers internal OS

  A/K/a Incomplete placenta previa
- Placenta does not cover dilated os.



Tupe 4:

Placenta completely covers internal OS.

Aka complete / Central placenta Previa

Minor degrees of placenta previa:

Type 1 anterior & posterior

Type 2 anterior

- Vaginal delivery can be tried

Major degrees of placenta previa:

Type 2 posterior

Type 3

Type 4

Cesarean section – Always

In all posterior varieties of placenta previa:

Fetal distress on pushing head into pelvis, perabdominally

→ Stallworthy Sign

Classification of abruptio placenta

00:24:43

Active space

Page classification:

Grade 0: Retrospective diagnosis

Based on retroplacental clot

Grade 1: Bleeding PV + pain abdomen (due to thromboplastin)

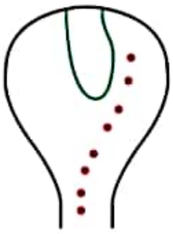
Leave Feedback

Grade 2: Bleeding PV + pain abdomen
Fetal distress/death

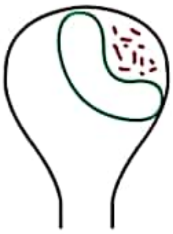
Grade 3: Bleed PV + pain abdomen
Fetal death + mother in shock
+/– DIC (thromboplastin)

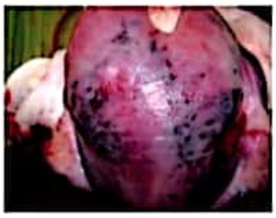
Varieties of abruptio:

1. Revealed variety



2. Concealed variety – blood collected
Behind placenta
↓
Enters myometrium
↓
Uterus appears bluish / wine coloured
K.a Couvelaire uterus
↓
a) Not an indication for hysterectomy
b) Risk factor for PPH





- m.c variety of abruptio → mixed variety

Presentation of placenta previa and abruptio

00:33:10

Placenta previa	Abruptio placenta
Bleeding in 3rd trimester	Bleeding in 3rd trimester
a) Bright red in colour	a) Dark red in colour
b) Painless	b) Pain in abdomen
c) Causeless	c) Cause Trauma (accidental hemorrhage) ↑ BP (PIH)
d) Recurrent in same pregnancy	
e) Warning hemorrhage ⊕	e) No warning hemorrhages

Active space

<table>
<tr><th>Placenta previa</th><th>Concealed abruptio</th></tr>
<tr><td>General examination:
Condition of patient proportional to blood loss</td><td>condition of patient not proportional to blood loss</td></tr>
<tr><td>P/A: uterus is soft, relaxed, Non - tender
FHS – easily heard
Fetal parts-easily felt</td><td>uterus – hard, tender, tensed
FHS – not easily heard
Fetal parts- not easily felt</td></tr>
<tr><td>Height of uterus= period of gestation (POG)</td><td>Ht.of uterus > POG</td></tr>
<tr><td>FHS ⊕</td><td>Fetal distress / Fetal death</td></tr>
<tr><td colspan="2">P/V: Contra- indicated in APH
contraindicated in placenta previa
IOC (for APH): Transabdominal USG (screening to differentiate between placenta previa and abruptio)</td></tr>
<tr><td>IOC for previa: TVS
(probe does not cross Internal OS)
• malpresentations more common in transverse lie > breech</td><td>IOC for abruptio
Clinical diagnosis>TAS</td></tr>
</table>

Management of abruptio placenta

00:48:50

Never wait and watch (↑ risk of DIC)

No tocolytics

Management: Resuscitation of mother + Immediate termination of pregnancy

Vaginal delivery in abruptio:

1) misoprost contra – indicated

Can cause tachysystole (>5 contractions in 10 minutes)

2) Oxytocin can be used to augment labour

3) Artificial rupture of membranes can be done

If a patient of abruptio develops DIC
↓
First correct DIC
↓
Followed by vaginal delivery

Management of placenta previa 00:56:34

Terminate pregnancy Immediately
↓
Active management

In any condition where mothers life is at risk

a) Hemodynamically unstable patient
b) Continuous bleeding ⊕
c) Gestational age ≥37 wks
d) Fetal distress ⊕
e) On USG -
congenital anomaly incompatible with life (anencephaly)

Continue the pregnancy
↓
Expectant management

Aim: To allow fetus to attain lung maturity Condition: Only if mother's life is not at risk

a) Hemodynamically stable patient
b) Bleeding has stopped
c) Gestation ≤ 36 weeks or patient in labour
d) No fetal distress.
e) On USG –
    - Normal fetus or congenital anomaly
    - Compatible with life (Polydactyly)

Mcafee and Johnson regime 01:09:58

Expectant management of placenta previa

1. Admit the patient
2. Arrange for blood
3. Rh negative female – Anti D (300mcg)
4. Inj.corticosteroid (to attain lung maturity)
5. Tocolytics (if contractions ⊕)
   Best – Nifedipine

Cervical cerclage: Not a component of expectant management

Expectant management

↓

- Carry till 37wks
- if:
  - Fetal distress ⊕
  - Bleeding episode ⊕

  ↓

  Terminate immediately

mode of delivery:

- minor degrees ↓ Vaginal delivery
- a) major degress of placenta previa
  b) Fetal distress
  c) Severe bleeding
  (irrespective of type of previa)

  ↓

  Cesarean section

To decide mode of delivery in placenta previa:

Assess type of previa

- USG
- Double set – up examination

  ↓

  Do a P/V examination in OT,
  after full preparation for
  a cesarean section

DIC

01:17:40

- Consumptive coagulopathy (all clotting factors are consumed)

Obstetrical causes of DIC:

- Abruptio placenta (m.c)
- IUD of fetus
- Amniotic fluid embolism
- Septic abortion
- Severe pre – eclampsia / Eclampsia / HELLP syndrome

Diagnosis:

S. fibrinogen (clotting factor 1): ↓

Fibrin degradation product (FDP): ↑

D- dimer: ↑

Management of DIC

Blood transfusion

Cryoprecipitate / FFP

Platelet transfusion

Heparin +/−

No role in DIC:

- EACA (Epsilon – amino caproic acid)
- Tranexamic acid

Recombinant factor VIII A: role in DIC uncertain

TWIN PREGNANCY – TYPES AND ETIOLOGIES

Twin pregnancy – types

00:00:29

Monozygotic (1/3 – 30%)

↓

- Single sperm fertilizes ova

↓

Single zygote

↓

Divides into two

- Always same sex
- A/K/A identical twins

↓

Same phenotype
Same blood group
Same HLA typing

- Different finger prints
- Incidence – constant Throughout the world

↓

1 in 250 pregnancies
4 in 100 pregnancies

- Due to Assisted reproductive techniques(ART) / In vitro fertilization (IVF)

↓

Incidence is ↑

Dizygotic (2/3 – 70%)

↓

- Two ova fertilized by two different sperms

↓

Two zygote formed

- Sex may be same / different
- Incidence – varies from country to country
  Maximum in Nigeria – 1 in 20 pregnancies
  Least in Japan – 1 in 200 pregnancies
  In India – 1 in 80 pregnancies

Active space

Hellin's rule for incidence in India

00:05:40

- In India
  Incidence of twins – 1 in 80 pregnancy
- Incidence of Triplets – 1 in $(80)^2$ pregnancy

- Incidence of quadruplets – 1 in $(80)^3$ pregnancy
- In dizygotic twins 2 ova fertilized by 2 sperms

↓ In the same cycle by 2 different acts of coitus → ↓ Superfecundation → ↓ Seen in humans

↓ In two different cycles → ↓ Superfetation → ↓ Not seen in humans

- Theoretically superfetation is possible in humans

↓

Until uterus is not obliterated – 14-16 weeks

Factors that affect dizygotic twinning

00:10:48

1) Race
2) maternal family history of twinning
3) maternal age >35 years
4) maternal parity >4
5) use of drug like Clomiphene citrate – 5-8%

Or

Procedures like ART/IVF

6) maternal obesity

- Dizygotic twins – Develop from two different zygotes

↓

zygotes develop their own chorion and amnion

↓

Dichorionic diamniotic (DCDA)

- So m.c type of twin pregnancy – Dizygotic twins / Dichorionic diamniotic twins

Zygosity and chorionicity

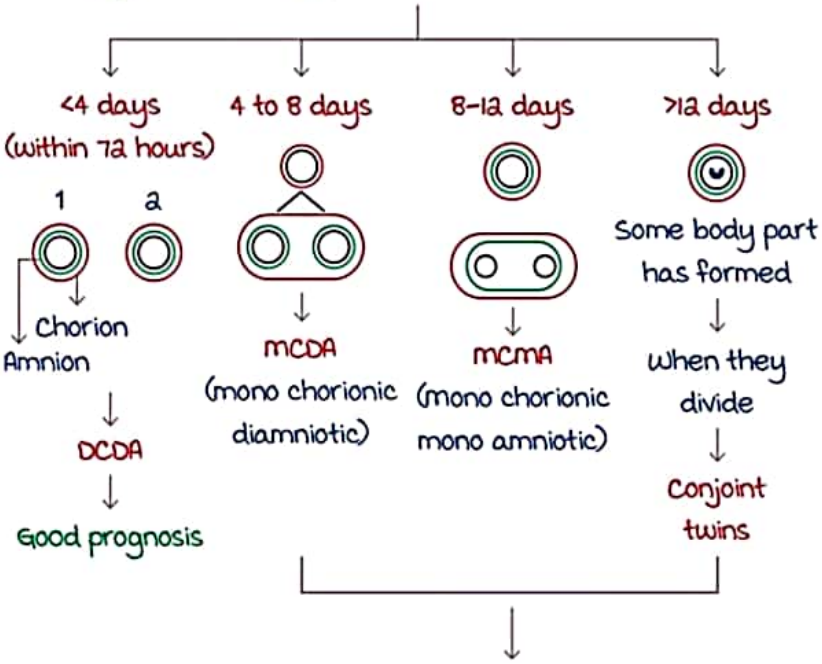
00:14:36

- Zygosity – Type of conception
- Chorionicity – Type of placentation
- Prognosis in twins – Depends on chorionicity & not zygosity

- monochorionic twins – Bad prognosis
- Dichorionic twin – Good prognosis
- Dizygotic twins – Always DCDA
  Always good prognosis

Monozygotic twins 00:17:02

- Number of chorions and amnions
  ↓
  Depends on the time of division
- Amnion – Formed on day-10
- Chorion – Formed on day – 8
- If the zygote in monozygotic twins divides


<4 days
(within 72 hours)
1
2
Chorion
Amnion
DCDA
Good prognosis
4 to 8 days
MCDA
(mono chorionic diamniotic)
8-12 days
MCMA
(mono chorionic mono amniotic)
>12 days
Some body part has formed
When they divide
Conjoint twins

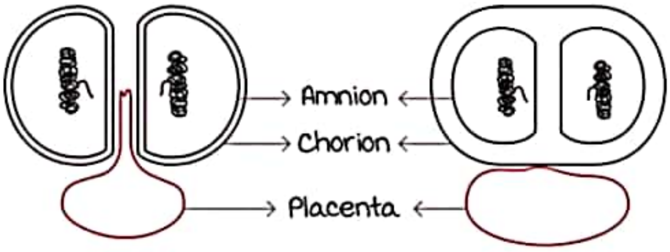
- m.c type of monozygotic twins – MCDA
- m.c type of dizygotic twins – DCDA

Chorionicity – investigation 00:30:22

- IOC – Trans vaginal ultrasound (TVS)
  ↓
  Time 11-14 weeks
  ↓
  In 1st trimester

Dichorionic Diamniotic
↓
Can come from
↓ monozygotic twin
↓ Dizygotic twin

Monochorionic diamniotic
↓
can be from
↓
monozygotic twin only



The placental tissue goes in between the two fetuses

The placental tissue cannot go in between the two fetuses

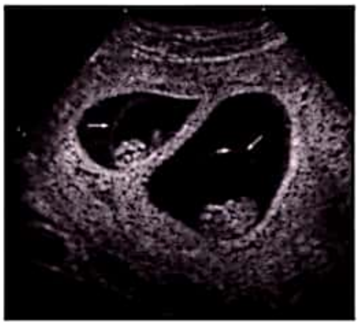
Difference between dichorionic diamniotic and monochorionic diamniotic

00:34:32

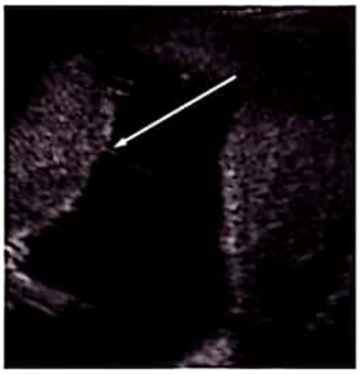
DCDA	MCDA
• Sex – Same or different ↓ 100% dichorionic	• Sex-same
• Four layers in between the twins	• Two layers in between the twins
• membranes are thick ≥ 2mm	• Thin membranes < 2mm
• Twin peak sign / Lambda sign – is positive ↓ Placenta insinuates between intertwin membrane	• Twin peak sign – is absent • T sign is present

Ultrasound images in twins 00:38:53

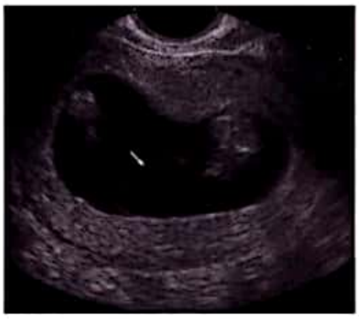
Usgs of twin peak sign /Lambda sign



→ DCDA
Twin peak /
Lambda sign present



→ MCDA
T – sign present



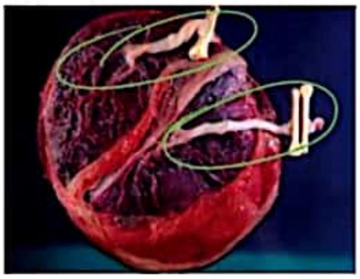
→ MCDA

- In MCMA – T – sign is absent

Dichorionic diamniotic – Twins 00:46:43

- They have good prognosis
- 4 layers of membranes–membranes are thick
- Time of delivery – 38 weeks

DCDA



Active space

Monochorionic diamniotic and monochorionic monoamniotic – twins

00:49:29

Monochorionic diamniotic

- They have bad prognosis

  ↓

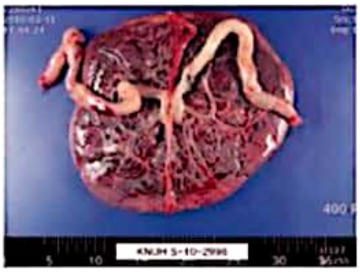
  Because of a complication

  ↓

  Twin-to twin transfusion syndrome
- 2 layers of membrane (membranes are thin)
- Time of delivery – 34-37 weeks + 6 days

  Ideally – at 37 weeks

MCDA



Monochorionic monoamniotic

- They have bad prognosis

  ↓

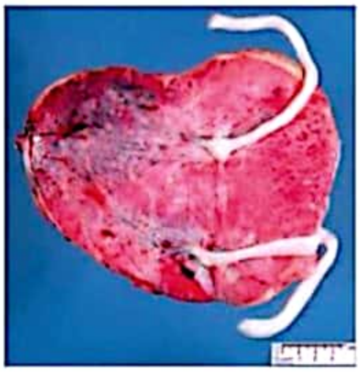
  Because the two fetuses are lying in the same amniotic fluid

  ↓

  ↑ risk of cord entanglement
- No layer of membranes in between the twins
- Best time to deliver – 32-34 weeks

  ↓

  Delivered only by cesarean section



⟶ MCMA

Active space

Conjoined twins

00:55:27

- M.C variety – Paraphagus – 1st
  Thoracophagus – 2nd
- Least common variety
  - Rachiphagus – vertebral columns joined – <1% cases
  - Craniophagus – Heads joined – 5% cases
- Worst prognosis – Craniophagus

On ultrasound – findings:

1) Heads of both fetuses lie at same level
2) 4 vessels in the cord seen
3) Relative position of the twins does not change
4) Extension of fetal spine

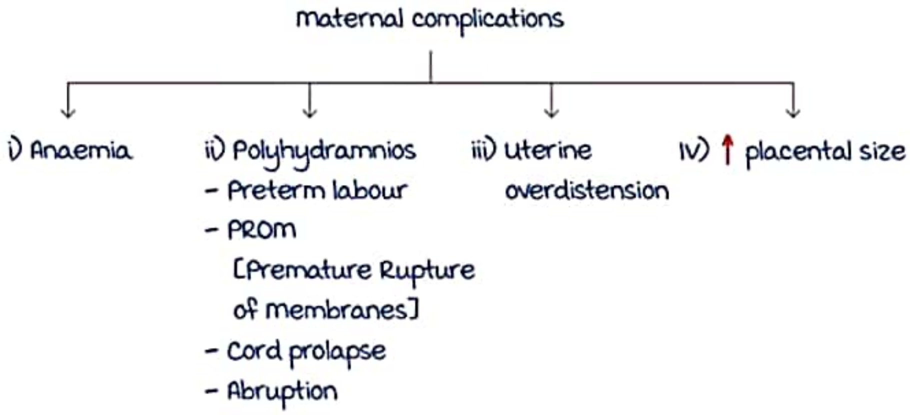
- They have single chorion single amnion
- Delivered only by cesarean section

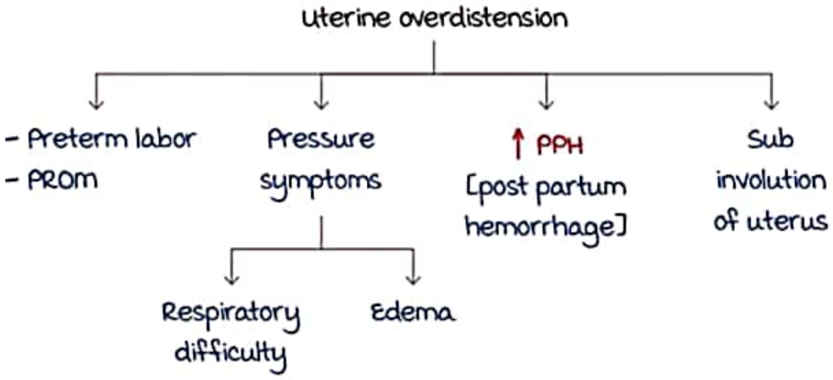
Active space

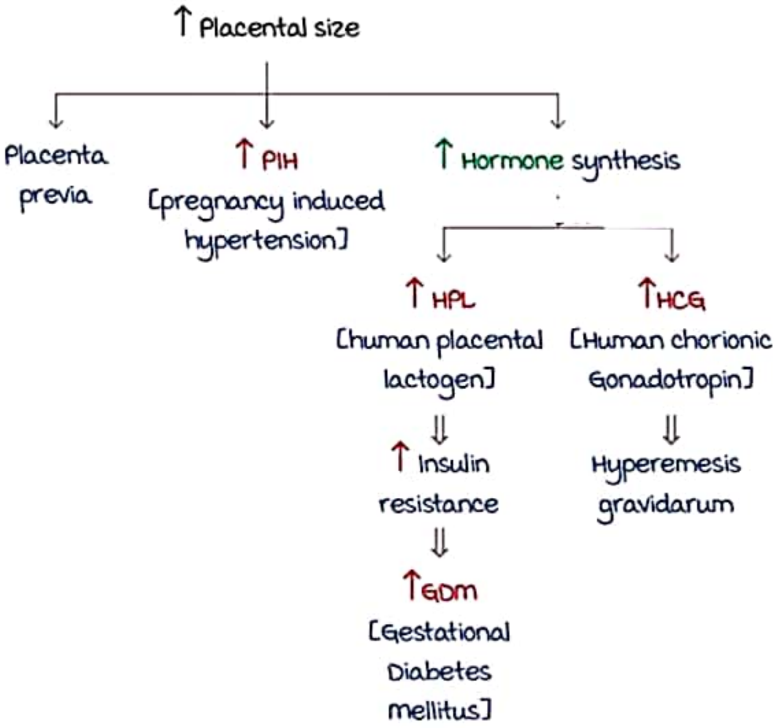
TWIN PREGNANCY-COMPLICATIONS & MANAGEMENT

Twin pregnancy – maternal complications

00:00:07


maternal complications
i) Anaemia
ii) Polyhydramnios
- Preterm labour
- PROM
[Premature Rupture of membranes]
- Cord prolapse
- Abruption
iii) Uterine overdistension
IV) ↑ placental size


Uterine overdistension
- Preterm labor
- PROM
Pressure symptoms
Respiratory difficulty
Edema
↑ PPH
[post partum hemorrhage]
Sub involution of uterus


↑ Placental size
Placenta previa
↑ PIH
[pregnancy induced hypertension]
↑ Hormone synthesis
↑ HPL
[human placental lactogen]
⇓
↑ Insulin resistance
⇓
↑ GDM
[Gestational Diabetes mellitus]
↑ HCG
[Human chorionic Gonadotropin]
⇓
Hyperemesis gravidarum

Twin pregnancy – Fetal complications

00:03:27

1. Complication which are never seen in twin pregnancy
   - Macrosomia
   - Post-term pregnancy
2. All complications are related to chorionicity & amnionicity except
   - Pre-term labor
   - IUGR [Intra-uterine Growth Retardation]

   Which are related to number of fetus

- In multi fetal pregnancy:

  Do fetal reduction

  ⇓

  DOC – Intracardiac injection of KCl

  – At 10-13 weeks of pregnancy

3. Most common complication of twin pregnancy → Preterm labor

Prevention of preterm labor

methods adopted

a. Frequent antenatal visits

b. Frequent USG [ultrasound]

  - monochorionic: every 2 weeks
  - Dichorionic: every 6 weeks

c. limited physical activity

methods not adopted

Pregnant women with twin gestation & No H/o preterm labour in previous pregnancy

↓

Advice

- No progesterone
- No tocolytics
- No circlage
- No bed rest

4. All complications of twin pregnancy are more in
   - Monochorionic > Dichorionic twins
   - Monozygotic > Dizygotic twins

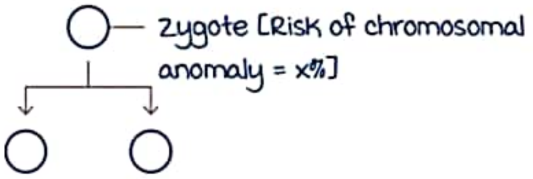
Except

Cumulative risk of chromosomal anomaly

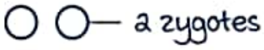
Fetal complications – Chromosomal anomaly 00:12:19

1. The cumulative risk of chromosomal anomaly in
   - Dichorionic twins > monochorionic twins
   - Dizygotic > monozygotic

a. monozygotic


Zygote [Risk of chromosomal anomaly = x%]

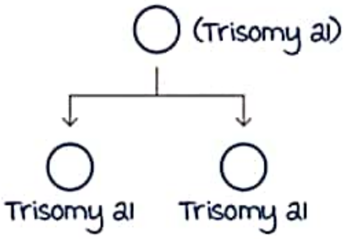
b. Dizygotic



∴ Risk of chromosomal anomaly = 2x%

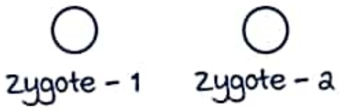
2. Trisomy -21

a. monozygotic


(Trisomy 21)
Trisomy 21
Trisomy 21

- Test for aneuploidy sample from 1 of the twins is sufficient

b. Dizygotic


Zygote - 1
Zygote - 2

- Zygote 1 = Down's syndrome +/−
- Zygote 2 = Down's syndrome +/−
- None may have
- Both may have

- Test for aneuploidy Sample should be taken from both twins

Complications of monochorionic twins 00:17:56

1. Vascular anastomosis between twins
   - Incase of deep anastomosis ⇒ TTTS [Twin to Twin Transfusion Syndrome]
2. Acardiac twin
3. Twin Anaemia Polycythemia Sequence [TAPS]

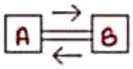
4. Selective IUGR
5. Congenital malformations
6. Specific complication

Monochorionic monoamniotic → Cord entanglement
[MCMA]

Vascular Anastomosis

↓ Superficial

i) more common variety
ii) most common type:
artery-to-Artery anastomosis
iii) Bidirectional flow [Based on pressure]



⇓

- No permanent donor
- No permanent recipient

⇓

∴ No TTTS

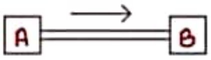
iv) mostly seen in MCMA twins

⇓

∴ TTTS not seen

↓ Deep

i) most common type:
Artery-to-vein anastomosis
ii) Occurs at the level of capillary bed
iii) Unidirectional flow



↓ Permanent donor
↓ Permanent recipient

↓

∴ TTTS seen

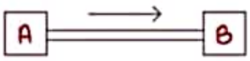
iv) mostly seen MCDA [Monochorionic Diamniotic] twins

⇓

∴ TTTS more common

Twin to Twin Transfusion Syndrome [TTTS] 00:25:28

- Seen in MCDA twins
- Deep artery of twin A → Deep vein of twin B



Donor	Recipient
1. Anaemia	1. Polycythemia
⇓	⇓
2. Findings	(Thrombosis)

- Sinusoidal pattern of FHR
[seen in donor twin, vasa previa, Rh incompatability]
- Peak systolic velocity of middle cerebral artery ↑

- Hemoglobin difference ≥ 5g/dl in both twins ⇒ TAPS

TAPS

↓ As a part of TTS
⇓
Oligo and poly hydramnios in the twins +

↓ As an isolated feature [≥ 26weeks]
⇓
No oligo and polydramnios in the twins

- Peak systolic velocity of middle cerebral artery

↓ Donor >1.5 mom

↓ Recipient twin <1 mom

2. Donor
↓ growth

2. Recipient twin
↑ growth

- Discordant growth (Different in growth)

⇓

Difference in

- Body weight of fetus ≥ 20%
  (with larger twin being taken as index)
- Abdominal circumference in USG ≥ 20 mm
- Biparietal diameter on USG ≥ 6 mm

3. Oligohydramnios

[↓ Blood flow
↓
↓ Renal Blood flow
↓
↓ GFR
↓
↓ Urine output]

- Tops ⇒ Twin oligo poly sequence
  i.e. If 1 twin has oligohydramnios, the other twin has polyhydramnios

3. Polyhydramnios

According to ACOG

- 2 Definitive features on USG diagnose TTTS are
  - i) MCDA
  - ii) TOPS

3. ↑ risk of renal failure [Renin Angiotensin System is activated]

↑ risk of congestive heart failure [Cyclic ANP is activated]

Staging of twin to twin transfusion syndrome 00:38:24

A. Quintero staging – (USG based)

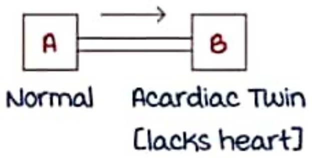
1. Twin-A: oligo, twin B: polyhydramnios + Bladder of Donor twin – visible on USG
2. Bladder of donor twin – not visible
3. Doppler changes
4. Hydrops in any of the twins
5. Death of any of the twin

B. CHOP score – For cardiac evaluation of recipient twin in TTTS

Management of TTTS:

- Definitive/Best ⇒ Fetoscopic laser ablation of anastomosis
  - Alternative ⇒ Serial amniocentesis management

Twin Reversed Arterial Perfusion (TRAP) 00:41:54

- 

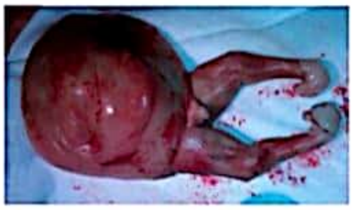
- Anastomosis – Artery to artery & vein to vein ⇓ (significant role)

- Pathology of TRAP

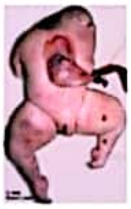
The umbilical artery [carry deoxygenated blood of twin A]
Of twin A
⇓
Takes blood to Twin B [acardiac]
⇓
Due to gravity
- Blood reaches the lower limbs of Twin B
  ∴ lower limbs are formed
- But, since twin B is acardiac – rest of body is not formed

- Varieties of TRAP

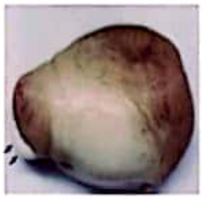
Acardius Acephalus [only lower limbs are formed]



Acardius myelacephalus [lower limbs + some part of head]



Acardius amorphous [No part of body formed]



Donor twin has – ↑ chance of heart failure
– ↑ mortality

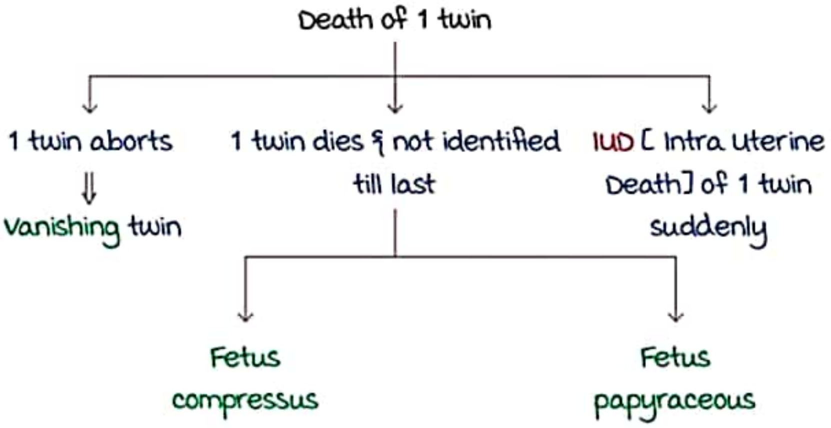
Management of TRAP

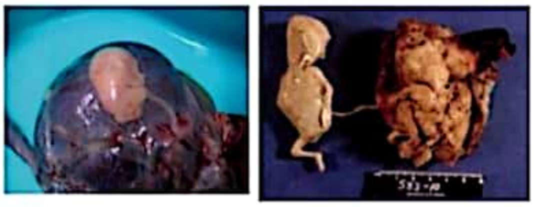
1. Volume of blood in acardiac twin – < 50%
   ⇓
   Wait and watch, deliver at 37 weeks
2. Volume of blood in acardiac twin – >50%
   ⇓
   Radio frequency ablation

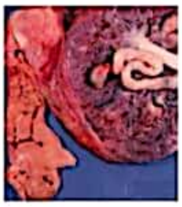
Active space

IUD in twin pregnancy

00:49:03


Death of 1 twin
1 twin aborts
Vanishing twin
1 twin dies & not identified till last
IUD [Intra uterine Death] of 1 twin suddenly
Fetus compressus
Fetus papyraceous





IUD

- more common in monochorionic twin
- more dangerous in monochorionic twin (due to anastomosis)

Neurological complications and death

- Preterm labor of the surviving twin in both monochorionic and dichorionic twin
- Aim – To carry pregnancy
  - Atleast till 34 weeks
  - Best upto 37 weeks

Case scenario

Twin pregnancy, in which 1 fetus dies at 32 weeks

⇓

management

- monitor the surviving twin
- Carry pregnancy atleast till 34 weeks

Delivery of twins

00:54:06

- most common presentation – both twins vertex
- 2nd most common – Twin A: vertex, Twin B: breech

mode of delivery (depends on 1st twin)

- 1st twin – vertex ⇓ Vaginal delivery
- 1st twin – Breech / transverse lie ⇓ Cesarean section

- 1st twin – Breech, 2nd twin – vertex

⇓

Cannot perform vaginal delivery due to complications of inter locking of twins

1st twin vertex

2nd vertex

- 1st twin – vaginal delivery

i) methyl ergometrine is contraindicated after delivery of 1st twin due to tetanic contractions

ii) oxytocin can be given

- 2nd twin – vaginal delivery

i) Duration should be <30 mins

ii) If exceeded ⇒ Cesarean section performed

2nd Breech

- 1st twin – vaginal
- 2nd twin – Assisted breech delivery

2nd Transverse

- 1st twin – vaginal
- 2nd twin

Take mother to OT

⇓

Give general anaesthesia [GA]

⇓

Internal podalic version

⇓

Breech extraction

Active space

Internal podalic version vs external cephalic version 01:04:10

Internal podalic	External cephalic
• Performed in OT	• Performed in OPD
• Under GA	• No anaesthesia
• Risk of uterine rupture ⊕	• Fetal distress
• Indications – 2nd twin in transverse lie [at the time of labor]	• Indications Single pregnancy ↓ Breech ↓ Transverse lie – To make it cephalic – Done antenatally ≥ 36 weeks
• Absolute contraindication – Previous cesarean section	• Relative contraindication – Previous cesarean section

Active space

RH ISOIMMUNIZATION: MECHANISM AND COMPLICATIONS

Rh antigens

- c, C, D (most important), E, e

D antigen

- Present → Rh +ve
- Absent → Rh −ve

- Located on short arm of chromosome 1
- Discovered by Landsteiner and Weiner

Rh negative pregnancy

00:01:52

1. Mother : Rh −ve
   Fetus : Rh +ve
   } Complications ⊕

2. Mother: Rh −ve
   Fetus : Rh −ve
   } No complications

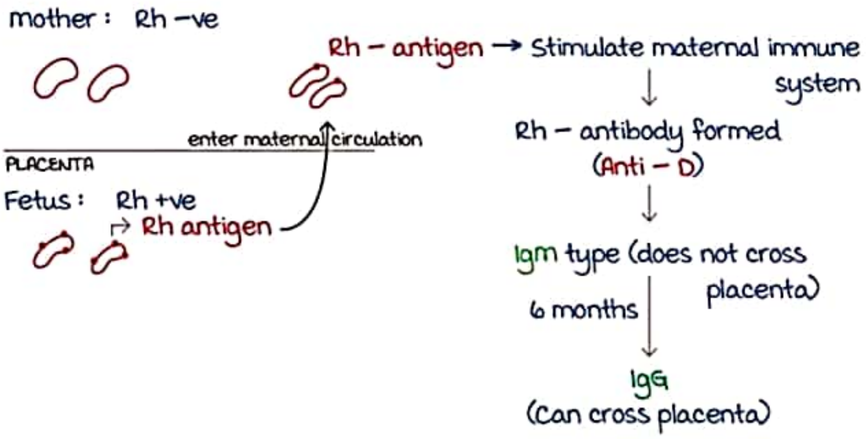
To find fetal Rh status

- If Husband – Rh −ve
  Wife – Rh −ve
  Fetus – Rh −ve (100%)
- If Husband : Rh +ve
  and wife : Rh −ve
  fetus can be Rh +ve

1st investigation in an Rh −ve pregnant female
↓
Rh status of husband

Active space

Pathogenesis of Rh negative pregnancy 00:05:06



mother : Rh –ve

Rh – antigen → Stimulate maternal immune system

↓

Rh – antibody formed (Anti – D)

↓

Igm type (does not cross placenta)

↓ 6 months

IgG (Can cross placenta)

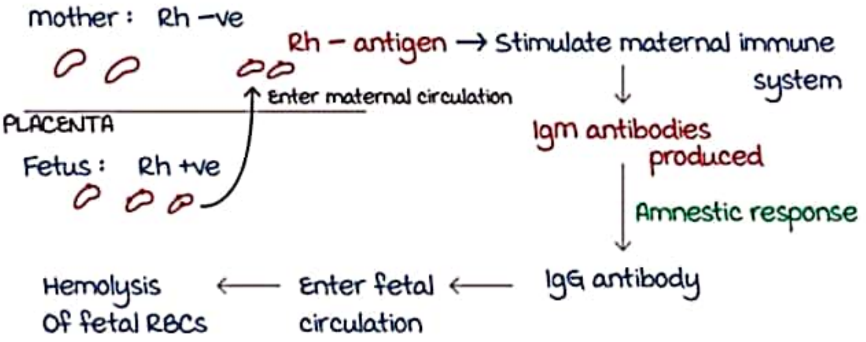
enter maternal circulation

PLACENTA

Fetus : Rh +ve

↳ Rh antigen

- First pregnancy safe (If IgG develops only 6 months after exposure)
- Next Pregnancy:



mother : Rh –ve

Rh – antigen → Stimulate maternal immune system

↓

Igm antibodies produced

↓ Amnestic response

IgG antibody → Enter fetal circulation → Hemolysis Of fetal RBCs

Enter maternal circulation

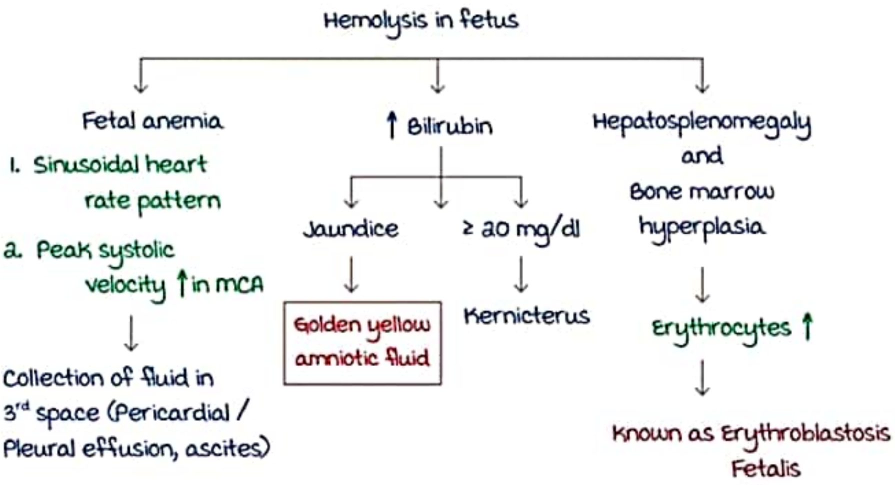
PLACENTA

Fetus : Rh +ve

Antibody formed in mother → Cause hemolysis in fetus

∴ Known as Rh immunization reaction

Fetal manifestations in Rh negative pregnancy 00:13:14



Hemolysis in fetus

Fetal anemia
1. Sinusoidal heart rate pattern
2. Peak systolic velocity ↑ in MCA

↓

Collection of fluid in 3rd space (Pericardial / Pleural effusion, ascites)

↑ Bilirubin

→ Jaundice → Golden yellow amniotic fluid

→ ≥ 20 mg/dl → Kernicterus

Hepatosplenomegaly and Bone marrow hyperplasia

↓

Erythrocytes ↑

↓

Known as Erythroblastosis Fetalis

Hemolysis in fetus
↓
Placentomegaly
(↑ blood supply to fetus from placenta)
↓
PIH in mother

Fetal manifestations :
1. Fetal anemia
2. Icterus gravidarum
3. Hydrops fetalis is (Grave / worst prognosis)

Hydrops fetalis

00:20:17

Diagnosis:

- Fluid in ≥ 2 body cavities (any of the following)
  - Pleural effusion
  - Pericardial effusion
  - Ascites
  - Skin edema → manifests as scalp edema
    ↓ On USG, halo ⊕
    Known as Buddha sign

Features of hydrops fetalis (not diagnostic criteria)
1. Polyhydramnios
2. Placentomegaly

Fetus → Skin edema, Scalp edema } Bloated appearance
mother → PIH → Edema, Polyhydramnios } Bloated appearance
} mirror syndrome

Hydrops fetalis
- Due to Rh negative pregnancy → Immune hydrops fetalis
- Due to any other cause → Non-immune hydrops fetalis (NIHF)

Causes of NIHF:

1. Parvovirus infection
2. Congenital heart blocks
3. α Thalassemia
4. GI disorders : Volvulus
5. Renal disorders: polycystic kidney disease
6. Chromosomal anomalies
7. Cystic hygroma
8. Twin to Twin Transfusion syndrome

PRETERM LABOR AND PROM

Preterm labor 00:00:18

- Preterm labor= < 37 weeks
- Before 37 weeks of gestation surfactants are not yet completely synthesized

  ↓

  Lungs are not mature

Surfactants:

- These are greasy material (Saponifying agents) Synthesized by type II pneumocytes

  ↓

  Help in smoother deflation of lungs

  ↓

  If it is absent

  ↓

  Respiratory distress syndrome

- 2 components:
  1. Phosphatidyl choline – 80%
     (maternal serum, fetal serum, amniotic fluid)
  2. Phosphatidyl glycerol – 15%
     (Present only in Amniotic fluid)

- Production:
  - Begins – 20 weeks
  - Appears in amniotic fluid – 28 weeks of pregnancy

Lung maturity test: 00:05:03

1) MC done test: Lecithin / Sphingomyelin ratio in amniotic fluid

≥2 → Lungs mature

<2 → Lungs not mature

a) Best test: presence of phosphatidyl glycerol in amniotic fluid

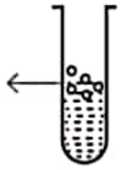
Present → Lungs mature

Absent → Immature lungs

Best test for assessing fetal lung maturity in Diabetic mother → Phosphatidyl glycerol

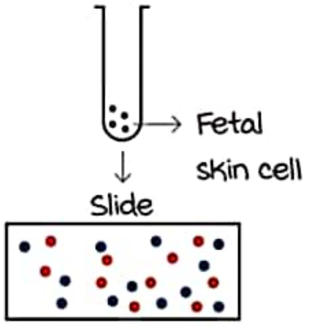
3. Bed side test: Shake/ Bubble test

If bubbles are present
↓
mature lungs



4. Nile blue sulphate test / Skin test:

- Amniotic fluid on centrifuging
↓
Fetal skin cells
↓
Add reagent – Nile blue sulphate dye
↓
Look under microscope
↓
If fetal skin cells have fat → Orange appearance
↓
≥ 50% → Lungs mature



5. TDX FLM test: Fluorescence polarization test

- Quantitative test which assess ratio of surfactant and albumin in uncentrifuged amniotic fluid

If surfactant: Albumin ≥ 55mg/grams
↓
"mature lungs"

6. Lamellar body count

Drugs for hastening lung maturity

00:14:30

DOC: Corticosteroids

	World wide	India
	Betamethasone	Dexamethasone
Dose:	2 injections, 12 mg each 24 hours apart	4 injection, 6 mg each 12 hours apart
Route:	Im	Im

- Contraindications for corticosteroids: Chorioamnionitis
- Effects begins after 24hrs of last injections maximum effect: 2-7 days
- Repetitive doses of corticosteroids are not given

↓

It can lead to cerebral palsy in fetus

- Maximum of 1 repeat dose can be given
- Lungs of fetus starts maturing by 34 weeks and completely mature by 37 weeks so

If preterm labour <34 weeks	If preterm labour ≥34 weeks
↓	↓
Corticosteroids given	Corticosteroids are not given

ACOG = Recommended 2017

↓

Should give corticosteroid

↓

Not yet followed

Preterm labour

00:21:09

- Labour begins at < 37 weeks
- MC cause – Idiopathic
- Causes:
  1. Infections – Asymptomatic bacteriuria, UTI bacterial vaginosis

Active space

2. Over distension of uterus (twin pregnancy, Polyhydramnios)

- mc risk factor: Previous history of preterm labour

Prevention of preterm labour:

1. Quit smoking
2. Progesterone (DOC)
3. Cervical Cerclage

Diagnosis:

- Contractions :

  ≥ 4 contractions in 20mins

  Or

  ≥ 8 contractions in 60mins

  (+) Any of following

1. Dilatation of cervix ≥ 3cms
2. Length of cervix ≤ 2cms
3. Length of cervix between 2-3cms

   (+)

   Fetal fibronectin protein should be present

- length of cervix to predict PTL- 2.5cms

Fetal fibronectin protein

00:27:09

- Extracellular matrix protein which is present in interface between the chorion and decidua
- If at any reason this interface is broken

  ↓

  Fibronectin Protein appears in Cervicovaginal discharge

  ≥ 50 ng/ml - then test is positive

  ↓

  Can be due to

  1) uterine contractions
  2) Infections
  3) Abruptio placenta

- FFN protein can be present in Cervicovaginal discharge:

  1) Preterm lab our
  2) PROM

Active space

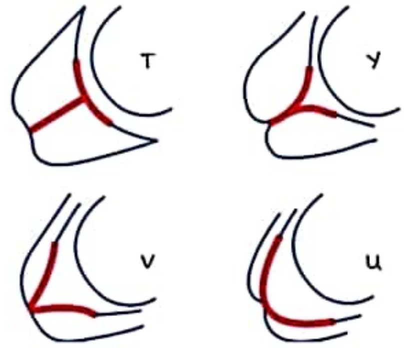
Shape changes in cervix at time of labour:

Normally: 'T' shaped

↓

As cervix dilates:
- 'Y' shaped
- 'V' shaped
- 'U' shaped

Correlation between the cervical length and changes of the internal cervical os



Problems with PTL

00:31:50

Lungs not mature

↓

DOC: ① Corticosteroid
- Need at least 24hrs to act

↓

② Give short term tocolytics

Brain not developed

↓

For neuro protection
DOC: ③ $mgso_4$ (at <28 weeks)

Management of preterm labor

00:34:49

≥ 34 weeks up till 36 weeks + 6 days

↓

① Send rectal/vaginal swab for group B streptococci
② Do not give corticosteroid
③ Wait and watch

< 34 weeks

↓

① Corticosteroids
+
② Short term tocolytics
+
③ If PTL < 28weeks

↓

$mgso_4$

mode of delivery:

Earlier:

If PTL= <34 weeks → Cephalic, Breech } Cesarean section

Now:

If PTL= <34 weeks
- → Cephalic – Vaginal delivery
- → Breech – Cesarean section

No role in PTL:

1) Antibiotics
  - Unless membranes are ruptured
  - Documented infection

2) Progesterone (Not a tocolytic)

Tocolytics

00:40:25

- Best tocolytic – Nifedipine
- Best tocolytic in heart disease – Atosiban (oxytocin antagonist)

Dose of Nifedipine: 20mg oral stat
↓ after 4-6hrs (every 4-6hrsly)
10mg oral till contractions subside
↓
10mg 8 hourly x 1 week

- Tocolytic with maximum fetal side effect: Indomethacin
- Tocolytic with maximum maternal side effect

↓

"β agonist"

Drugs used	Side effects mc – Tremors
① Salbutamol	- Hyperglycemia
② Ritrodrine	- Hypokalemia
③ Isoxsuprine	- Pulmonary edema
④ Terbutaline	→ Contraindicated in diabetes

- $mgSO_4$ acts as tocolytic at 9-10 meq / lt

↓

Toxic

↓

Hence not used as tocolytic

- Drugs with tocolytic effect but not used :
  1. Alcohol
  2. Halothane
  3. Diazoxide

Premature Rupture Of Membranes (PROM) 00:46:23

- Normally membranes rupture at end of 1st stage of labour, when cervix is fully dilated
- In PROM membranes rupture before onset of labour
- In preterm PROM membranes rupture before 37 weeks of pregnancy
- Artificial rupture of membranes – Amniotomy
  - Instrument: Kocher's forceps
  - Indication:
    1) To augment labour (accelerate the process of labour)
    2) In Fetal distress during labour

Contraindications

1. maternal HIV infections
2. maternal genital herpes
3. IUD of fetus
4. Polyhydramnios

↓

ARM- Contraindicated, controlled ruptures to be performed

Management 00:57:38

- Per vaginal examination is contraindicated
- Sterile per speculum examination (can be done)

- Test done for diagnosing PROM

Nitrazine test
↓
Principle: Amniotic fluid
↓
Alkaline pH (7.2-7.4)
Vaginal discharge
↓
Acidic pH (3.5)
↓
Introduce nitrazine paper
↓

Blue
↓
pH- alkaline in amniotic fluid
↓
PROM

Yellow
↓
pH - acidic
↓
Vaginal discharge

Fern test
↓
Based on principle:
① Cervical discharge of pregnancy
↓
allowed to dry
↓
beaded appearance

② If amniotic fluid is allowed to dry
↓
Fern like appearance

- Other tests:

  Fibronectin protein test:

  If fibronectin protein is present in cervicovaginal discharge before 37 weeks of pregnancy
  ↓
  Preterm labour or PROM

- Best Investigation: USG
  ↓
  Amniotic fluid decreases

Risk of PROM/PPROM

01:05:10

- ① Lungs not matured
  - DOC: Corticosteroids (+) Short term tocolytics
- ② Brain is not properly developed
  - DOC: mgso4 (<28weeks)
- ③ Increase chances of infection
  - Antibiotics

management of PPROM

- ≥ 34 weeks to 36 weeks + 6 days
  - ① Corticosteroids not given (ACOG= Corticosteroids should be given)
  - ② Antibiotics given
  - ③ IOL
- <34 weeks
  - ① Corticosteroids
  - +
  - ② Short term tocolytics
  - +
  - ③ $MgSO_4$ (If PPROM <28 weeks)
  - +
  - ④ Antibiotics

Active space

POST TERM PREGNANCY

Post Term Pregnancy: Any pregnancy which goes beyond 42 weeks

- Naegele's formula →
  - Expected date of delivery (EDD) =
  - 1st day of last menstrual period + 9 months and 7 days

If 1st day of LMP = 1st September 2018

EDD = 8th June 2019

- Only 4% ♀ deliver on exact EDD
- 50% ♀ deliver → 1 week before or 1 week after EDD

- If no delivery – even after 1 week of EDD = After 42 weeks ↓ Induce labor
- Pregnancy not to be continued beyond 42 weeks

Complications: Post term pregnancy

00:04:50

- Oligohydramnios – meconium aspiration syndrome
- macrosomia – Fat around shoulder & trunk
  - Shoulder dystocia
  - Intracranial haemorrhage
  - ↑ chance of caesarean section
- Placental aging – Placental insufficiency ↓ Fetal distress
- 1st step on approach to post term pregnancy = Review her menstrual History

Fetal ACTH ↓

- Fetal adrenal gland → DHEA – S → Placenta Synthesize Estrogen ↓ Signal uterus to start contractions

∴ for labor to initiate → Intact fetal adrenal gland is required

Active space

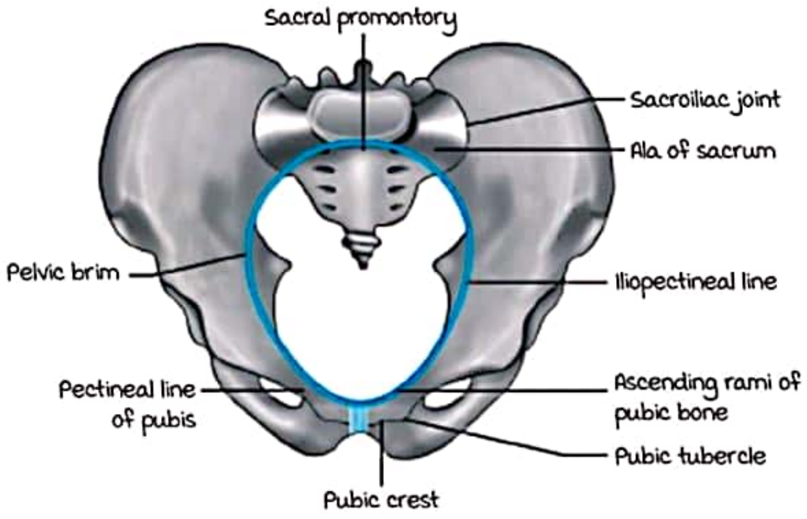
In Anencephaly: Fetal Adrenal glands – Absent / Hypoplastic
↓
Post Dated Pregnancy.

MATERNAL PELVIS: NORMAL AND CONTRACTED

Pelvis

00:01:15

- Composed of 4 bones:
  - Sacrum
  - Coccyx
  - 2 innominate bones
- Each innominate bone is formed by fusion of 3 bones:
  - Ileum
  - Ischium
  - Pubis
- Pelvis is divided anatomically into false pelvis and true pelvis by pelvic Brim


Sacral promontory
Sacroiliac joint
Ala of sacrum
Pelvic brim
Iliopectineal line
Pectineal line of pubis
Ascending rami of pubic bone
Pubic tubercle
Pubic crest

Boundaries of the pelvic brim

- The boundaries of pelvic brim or inlet (from anterior to posterior) are:
  Upper border of pubic symphysis → Pubic crest → Pubic tubercle → Upper border of superior pubic rami → Iliopectineal eminence → Iliopectineal lines → Sacro iliac joint → Ala of sacral bone → Sacral promontory

- False pelvis
  - Lies above pelvic brim
  - No obstetric significance

- True pelvis :
  - Lies below pelvic brim
  - Important role in child birth and delivery

- True pelvis can be divided into:
  - Pelvic inlet : Lies at level of pelvic brim
  - Pelvic cavity / midpelvis : Lies at level of ischial spine
  - Pelvic outlet : Lies at level of ischial tuberosity

Major diameters of pelvis

00:09:51

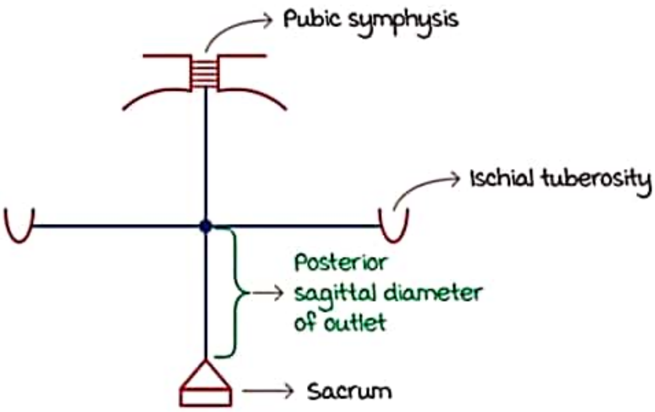
	Inlet	mid pelvis	Outlet
Antero-posterior (AP) Diameter	True conjugate → Distance between upper border of pubic symphysis and sacral promontory (SP) = 11 cm Obstetric conjugate → Distance between middle of pubic symphysis and S.P = 10-10.5 cm Diagonal conjugate → Distance between lower border of pubic symphysis and S.P = 12 cm	Line joining lower border of pubic symphysis to the junction of S4-S5 vertebra 12 cm (11.5 cm)	11.5-13 cm ↓ At the time of labour
Oblique Diameter	Left oblique diameter - from left sacroiliac joint to right iliopectineal eminence - 12 cm		
Transverse Diameter	13 cm	Bispinous diameter / interischial diameter 10 cm	Bituberous 11 cm

Important points related to diameters of pelvis 00:19:42

- Smallest AP diameter of pelvis → Obstetric conjugate
- Largest AP diameter of inlet → Diagonal conjugate
- Out of three AP diameters of pelvic inlet ; only Diagonal conjugate can be measured clinically
- Critical obstetric conjugate → 10 cm (i.e if obstetric conjugate is less than 10 cm vaginal delivery is not possible)
- If diagonal conjugate is x cm in a female; then obstetrical conjugate will be x-1.5 or 2cm
- Interspinous diameter
  - Shortest major diameter of pelvis
  - Most important diameter during delivery

Posterior sagittal diameter 00:27:50

- Posterior sagittal diameter of outlet



  - Distance from the tip of coccyx to the point at which transverse diameter and antero-posterior diameter bisect each other
  - ≥ 7 cm

- Posterior sagittal diameter of mid pelvis → 4.5 cms
- Posterior sagittal diameter of inlet → 4.0 cms

1.Angle of inclination-angle between plane of pelvic inlet with horizontal plane=55°C

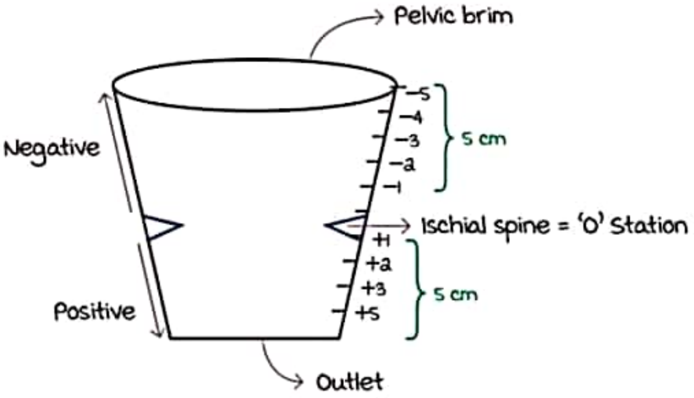
- High inclination-increase in no. of sacral bones(S5→S6). Fetus will take longer time to get engaged therefore time of delivery also increases

- Low inclination-decrease in no. of sacral bones(lumbarization of sacral bone). therefore faster engagement and easier delivery.

2.Subpubic angle-obtuse in females
acute in males

Significance of ischial spine 00:34:35

1. Station of fetal head



2. Internal rotation of fetal head occurs at this level

3. Deep transverse arrest occurs at this level

4. Site for giving pudendal nerve block – sacrospinous ligament is pierced while giving block

5. Levator Ani muscle is attached here

6. Ring pessary in case of prolapse is inserted at this level

- Time for pelvic Assessment
  - Primigravida = 37 weeks
  - Multigravida = At the onset of labor

Contracted pelvis 00:40:34

- Any of major diameter of pelvis ↓ by ≥ 1 cm

•

Contracted at

Inlet	midpelvis	Outlet
→ Obstetric conjugate <10 cm	→ Interischial diameter <8 cm	→ Inter tuberous diameter < 8 cm
→ Clinically: Diagonal conjugate minus 1.5 cm to 2 cms	→ Clinically: Both ischial spines can be touched with 2 fingers of same hand	→ Clinically: If 4 Knuckles cannot be inserted between ischial tuberosities

- Varieties of contracted pelvis:

Naegles pelvis	Robert pelvis
→ Only 1 ala of sacral bone is present	→ Both ala of sacral bone are absent

Management: Cesarean section

Cephalo – Pelvic Disproportion (CPD)

00: 48: 45

- Fetus is too large or pelvis is too small for this delivery
- CPD can also occur at level of inlet/cavity/outlet
- Management:
  - mild CPD at level of inlet → Trial of labour
  - moderate / severe degree of disproportion at: cesarean level of inlet
  - Disproportion at level of cavity / outlet: cesarean
- Trial of labour
  - Obstetrician is aware that patient has mild CPD at level of inlet
  - Vaginal delivery is being tried
- Trial of scar
  - Patient is a previous c-section, in whom cesarean was done due to a non-recurring cause like fetal distress
  - Vaginal delivery is being tried in the next pregnancy in the patient
  - Trial of scar = Vaginal Birth after cesarean (VBAC)

Clinical condition 1: A G2P1 female with previous vaginal delivery has mild CPD at level of inlet

Management: Trial of labour

Clinical condition 2: A G2P1 female with previous cesarean section due to fetal distress, has normal pelvis and no fetal distress

Management: VBAC / Trial of scar

Clinical condition 3: A G2P1 female with previous C-section due to fetal distress, has mild CPD at level of inlet and no fetal distress

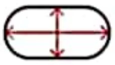
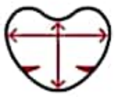
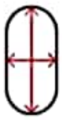
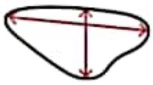
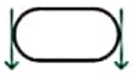
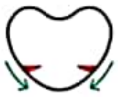
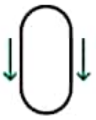
Management: Cesarean section

Trial of labour is contraindicated in previous cesarean patients

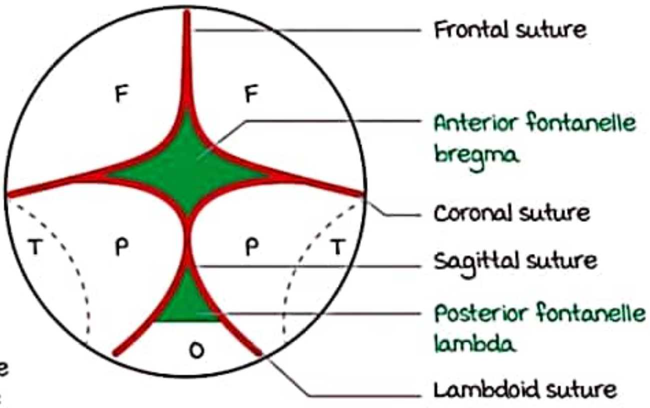
Normal varieties of pelvis

00:57:25

- On the basis of shape of the inlet, the pelvis can be of 4 types
- Caldwell and Mohoy classification:
  - Gynecoid 50% → Female type pelvis – most suitable for vaginal delivery
  - Anthropoid 25%
  - Android 20% → male type pelvis – least suitable vaginal delivery
  - Platypelloid 5% → Flat bowl like pelvis

	Gynecoid	Android	Anthropoid	Platypelloid
Diagram:				
Type:	Female	Male		Bowl like pelvis
AP/Transverse diameter:	TD > AP	TD > AP	AP > TD	TD >>> AP
Shape of inlet:	transverse oval	Heart shaped	AP oval	Bowl shaped
Side walls:				
	Straight (broad)	Convergent	Straight (Narrow)	Divergent
Ischial spine:		Prominent		
Sub pubic Angle:	Obtuse	Acute		

FETAL SKULL


F
F
T
P
P
T
O
Frontal suture
Anterior fontanelle bregma
Coronal suture
Sagittal suture
Posterior fontanelle lambda
Lambdoid suture

F = Frontal bone
P = Parietal bone
T = Temporal bone
O = Occipital bone

Diameters of fetal skull

Always AP diameters are greater than transverse diameters

AP diameter

Mentovertical [14 cm]

- Longest AP diameter
- Brow presentation
- Always C.section

Submentovertical [11.5 cm]

- 2nd longest
- Face presentation

Occipito Frontal [11.5 cm]

- Occipito posterior

Transverse Diameter: mnemonic

Miss – Bimastoid Diameter – 7.5 cm (shortest)

Tina – Bitemporal Diameter = 8 cm

So – Super subparietal diameter = 8.5 cm

Pretty – Biparietal diameter = 9.5 cm (largest)

Parts of fetal skull

00:16:36

Part	Definition	Seen in	Engaging diameter
• Vertex	Part between anterior fontanelle & posterior fontanelle	Head of baby is fully flexed	Sub occipito bregmatic (9.5 cm)
• Brow	Part between anterior Fontanelle on one side and root of nose & supra orbital ridges on the other side	Head is deflexed	mentovertical diameter (14 cm) C. section is mandatory
• Face	Between root of nose & supra orbital ridge on one side & chin on the other side	Fully extended head	Submento vertical diameter (if mento posterior) Sub mento bregmatic (if mento anterior)

Moulding

00:25:56

Alteration of shape of fetal skull during labor

Grades:

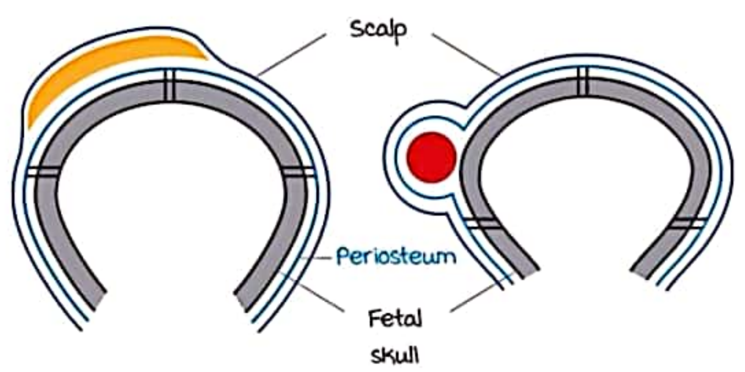
Grade 1 – Skull bone of fetus touch each other

Grade 2 – Skull bone overlap eachother, but can be separated

Grade 3 – Skull bone overlap & cannot be separated

Fetal scalp swelling

00:28:19


Caput succedaneum

Cephalohematoma

Caput succedenum	Cephal hematoma
• Diffuse swelling above the periosteum	• Localized swelling below periosteum
• Cause: Head of fetus stay > in one position for very long time during delivery	• Traumatic – especially instrumental delivery
• Pitting ⊕	• Pitting ⊖
• Cross the suture line	• Doesn't cross suture line
• Not associated with # of underlying bone	• Associated with # of underlying bone
• Jaundice ⊖	• Jaundice may be ⊕
• Present at the time of birth & disappears few hours after birth	• Doesn't appear at birth & disappear after few days

TERMINOLOGY RELATED TO LABOR

Lie 00:00:05

- Relationship between long axis of fetus & long axis of mother

Longitudinal lie: mc lie

- Long axis of mother & long axis of fetus – Coincide with each other

Oblique lie:

- Long axis of fetus make angle with long axis of mother
- Do caesarean section

Transverse lie:

- Long axis of mother & long axis of the fetus are at 90° to each other
- Always do caesarean section (if baby is alive / dead)
- ↑ incidence of cord prolapse
- ↑ incidence of hand prolapse

Unstable lie 00:05:43

- When lie of the fetus is not fixed by 37 weeks
- Causes:
  - Idiopathic (mc)
  - Polyhydramnios
  - Placenta previa
  - Abnormal shape of pelvis
- Oligohydramnios } doesn't lead to unstable lie
- Uterine malformation }
- Management – Caesarean Section

Presentation 00:07:36

- Part occupying lower part of uterus
- mc Presentation – Cephalic
- Apart from Cephalic, all the other presentations are malpresentations
- mc malpresentation – Breech (buttocks)

- Neglected Shoulder Presentation:
  - Dead baby with shoulder presentation
  - management - C-Section

Presenting part

00:10:18

- Part of presentation directly lying over the internal os
- Well-flexed head – Vertex (mc)
- Fully extended head – Face
- Partially extended – Brow → Always do C-section

Denominator

00:14:54

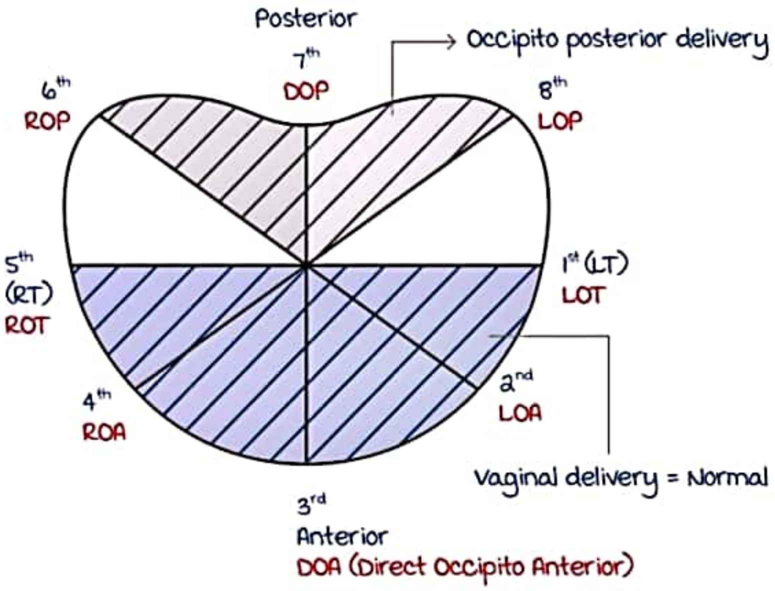
Bony point of reference on presentation used to describe the position

Vertex – Occiput	Brow – Frontal bone
Face – mentum	Breech – Sacrum

Positions

00:15:22

- Ⓝ Vaginal delivery – Position from 1 to 5
- Occipito posterior (mc malposition) – 6 to 8
- mc Position of fetus = LOT
- mc Position during labor = LOT
- mc Position during late labor = LOA
- mc Occipito anterior position = LOA
- mc Occipito posterior position = ROP
- mc postion in breech = LSA
- mc position in face = LMA


Posterior
7th
DOP
Occipito posterior delivery
6th
ROP
8th
LOP
5th
(RT)
ROT
1st (LT)
LOT
2nd
LOA
4th
ROA
Vaginal delivery = Normal
3rd
Anterior
DOA (Direct Occipito Anterior)

Active space

NORMAL AND ABNORMAL LABOR

Normal labor and uterine contractions 00:00:14

- Three things are needed for normal labor

↓

3-P's

Passenger

Passage-normal Pelvis

Push-uterine contractions

Uterine contractions

- Braxton hicks contractions – Painless and irregular contractions through out the pregnancy

- During labor-the contractions are painful and lead to dilation of cervix

Uterine contractions starts at the cornu (Pace maker) ↓ Right cornu pacemaker > left

Contractions are predominant over the fundus ↓ Fundal predominance

Contractions spread ↓ Through out uterus at 2 cm/sec ↓ Depolarizing the whole organ within 15 secs

- Polarity of uterus – isthmus in non pregnant female is 0.5 cms, during pregnancy

↓

isthmus enlarges – Forms lower uterine segment

↓

The length of lower uterine segment at labor – 10 cm

↓

During labor– The upper uterine segment actively contracts, lower uterine Segment dilates passively called as polarity of uterus

↓

Allowing the baby to move out of the uterus out

↓

↓

And upper uterine segment – Contracts & dilate

↓

Pushes the baby down

- Retraction of uterine muscles – During labor, when the upper uterine segment contracts and relaxes

↓

The muscles will not come back to its original length

↓

The muscles get shortened as the contraction progresses
This is called retraction

Events and intrauterine pressure

00:06:40

Events	Intrauterine pressure
• Contractions begin at	10 mm Hg
• Contractions are painful	15 mm Hg
• Cervix dilates at	15 mm Hg
• Fundus cannot be intended at	40 mm Hg
• 1st stage of labor	40–50 mm Hg
• 2nd stage of labor	100–120 mm Hg

- Adequate uterine contractions
  - Frequency ↓ 3 contractions in 10 min
  - Duration ↓ Each contraction lasting for 45 sec
  - Intensity ↓ Intrauterine pressure of 65–75 mm or 220 montevideo unit

- Tachysystole – more than 5 contractions in 10 minutes

↓

Due to ↑ pressure in contraction –
↓ volume of blood → To fetus

↓

Can lead to fetal distress

↓

If fetal distress → Hyperstimulation of uterus (term no longer used)

Unit of uterine activity and prelabor

00:11:24

Unit of uterine activity

- Units for measuring uterine contractions
  - mm of Hg
  - montevideo unit (mv unit)

1 montevideo unit = Intensity of uterine contraction × number of contractions in 10 minutes

e.g – 4 contractions in 10 minutes
each lasting for – 35 secs
generating – 50 mm Hg intrauterine pressure

↓

4 × 50=200mv

Prelabor

- Before true labor – Stage of pre labor

↓

Characterized by
  - False labor pain
  - Lightening
  - Softening of cervix
    ↓
    Ripening of cervix

Active space

Cervical ripening

- The changes which occur in cervix at ripening

Collagen → Decreases

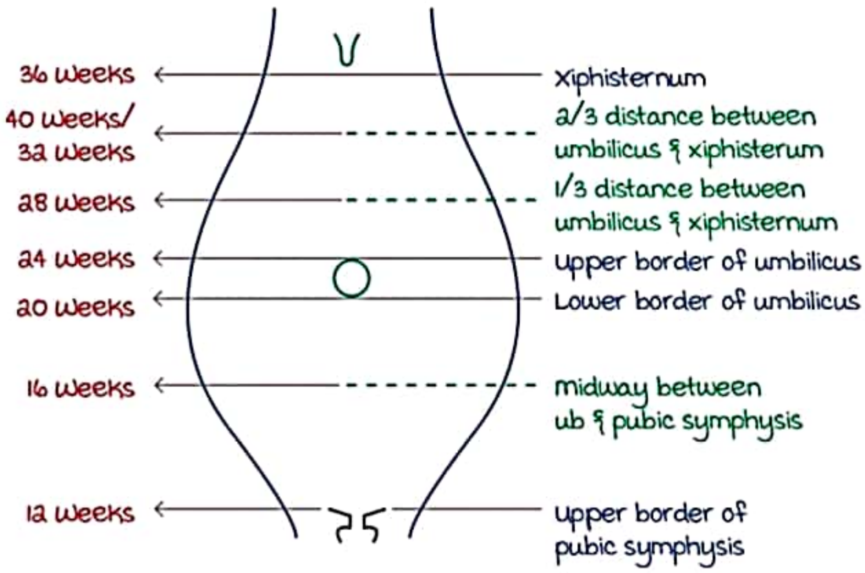
Hyaluronic acid → Increases

Dermatan sulphate → Decreases

- During induction of labor-cervical ripening is checked
↓
Using Bishop's score

Uterus at different times of pregnancy

00:17:04


36 weeks
Xiphisternum
40 weeks/
32 weeks
2/3 distance between
umbilicus & xiphisterum
28 weeks
1/3 distance between
umbilicus & xiphisternum
24 weeks
Upper border of umbilicus
20 weeks
Lower border of umbilicus
16 weeks
midway between
ub & pubic symphysis
12 weeks
Upper border of
pubic symphysis

- Lightening – After 36 weeks, head of fetus goes inside pelvis
↓
The height of uterus ↓–like at 32 weeks
↓
Respiratory discomfort is relieved
↓
Called welcome sign

False labor pain and true labor pain

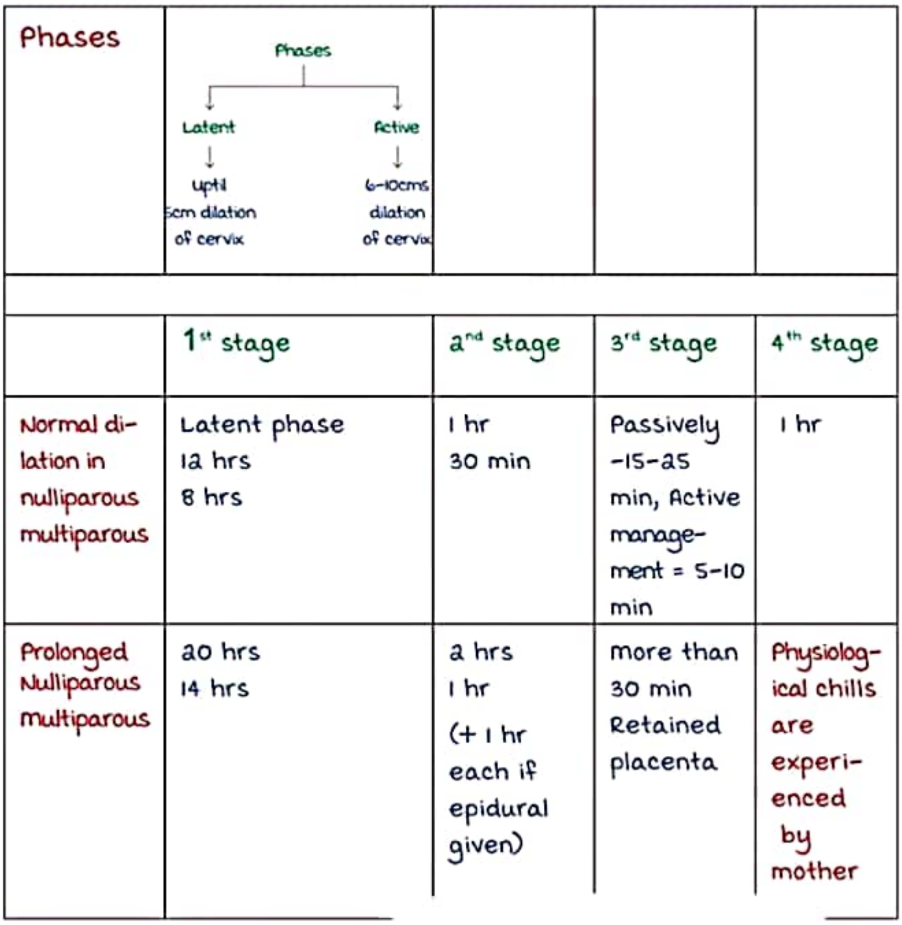
00:22:04

False labor pain	True labor pain
• Constant / Irregular	• Regular & Rhythmic (Off & On)
• Located in lower abdomen	• Located in lower abdomen but it is radiated to back and thigh
• Does not lead to dilation of cervix	• Leads to dilation of cervix
• Show is absent	• Show is present (show – blood mixed mucous discharge)
• On per vaginal examination ↓ Bag of water absent (Fetal membranes+amniotic membranes)	• On per vaginal (PV) examination ↓ Bag of water present
• Do not ↑ in intensity, frequency and duration	• They ↑ in intensity, frequency, duration with passage of time
• Clinically-Pain subsides on rest,sedation,enema	• Pain does not subside
	• True labor pain mark the beginning of true labor

Stages of labor

00:28:39

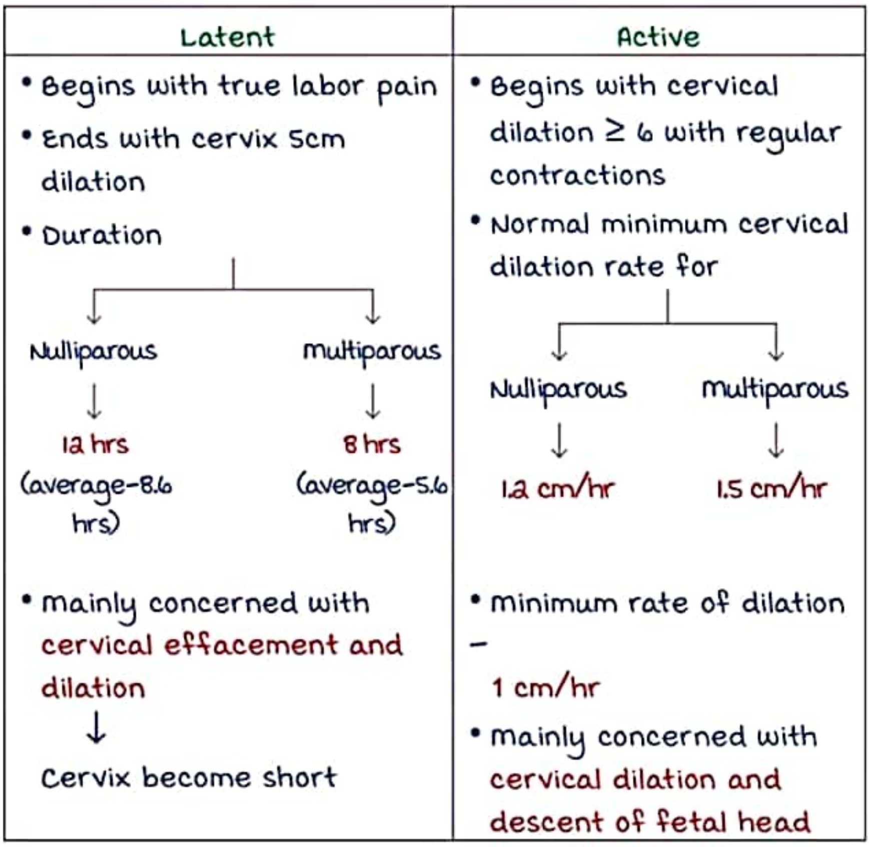
	1st stage	2nd stage	3rd stage	4th stage
Definition	• Begins with onset of true labor pains • Ends with full dilation of cervix (10cm)	• Begins with full dilation of cervix • Ends with delivery of baby	• Begins with delivery of baby & ends with delivery of placenta	• 1 hr observation period after delivery of placenta



Phases	Phases Latent → uptil 5cm dilation of cervix Active → 6-10cms dilation of cervix			
	1st stage	2nd stage	3rd stage	4th stage
Normal dilation in nulliparous multiparous	Latent phase 12 hrs 8 hrs	1 hr 30 min	Passively -15-25 min, Active management = 5-10 min	1 hr
Prolonged Nulliparous multiparous	20 hrs 14 hrs	2 hrs 1 hr (+ 1 hr each if epidural given)	more than 30 min Retained placenta	Physiological chills are experienced by mother

First stage of labor – latent and active phases

00:35:25



Latent	Active
• Begins with true labor pain • Ends with cervix 5cm dilation • Duration Nulliparous → 12 hrs (average-8.6 hrs) multiparous → 8 hrs (average-5.6 hrs) • mainly concerned with cervical effacement and dilation ↓ Cervix become short	• Begins with cervical dilation ≥ 6 with regular contractions • Normal minimum cervical dilation rate for Nulliparous → 1.2 cm/hr Multiparous → 1.5 cm/hr • minimum rate of dilation – 1 cm/hr • mainly concerned with cervical dilation and descent of fetal head

Abnormality of latent phases

Prolonged latent phase

Definition
- ≥ 20 hours in nulli
- ≥ 14 hours in multi
- Earlier definition ≥ 8 hrs

Causes
- Excessive sedation or epidural analgesia
- Poor cervical conditions (e.g thick, uneffaced or undilated)
- False labour-M.C.C in multipara

Management
- Therapeutic rest - BEST
- D.O.C for ripening of cervix ↓ PGE2 (Dinoprost gel)/ cerviprime gel

First stage of labor – abnormalities of active phase 00:42:43

Active phase – normal

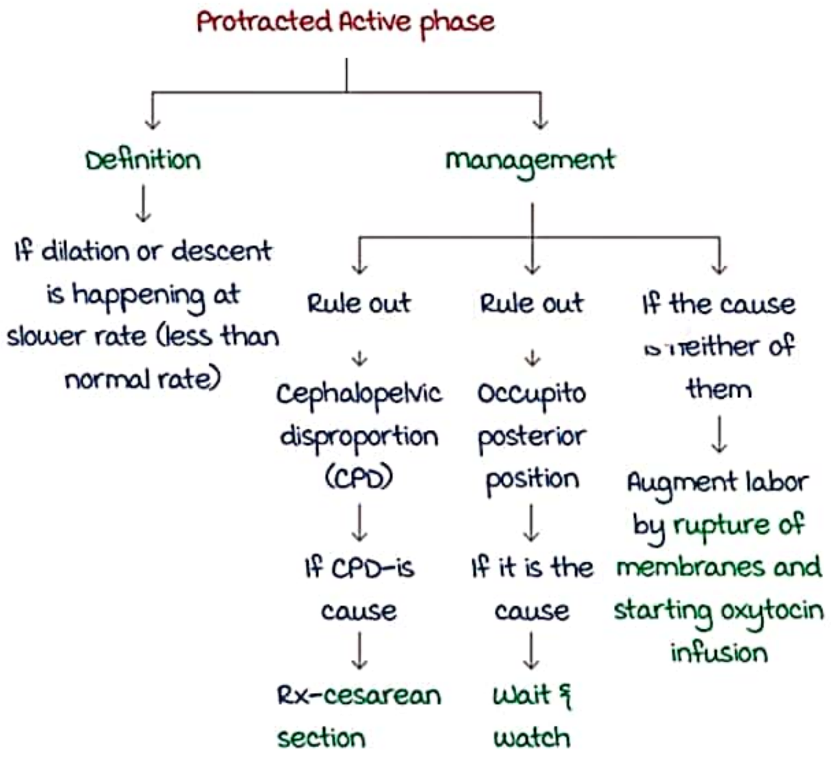
Dilation of cervix ↓

Nulliparous – 1.2cm/hr
Multiparous-1.5cm/hr
(According to WHO- minimum should be 1 cm/hr)

Descent of fetal head ↓

Nulliparous – 1cm/hr
Multiparous – 2cm/hr

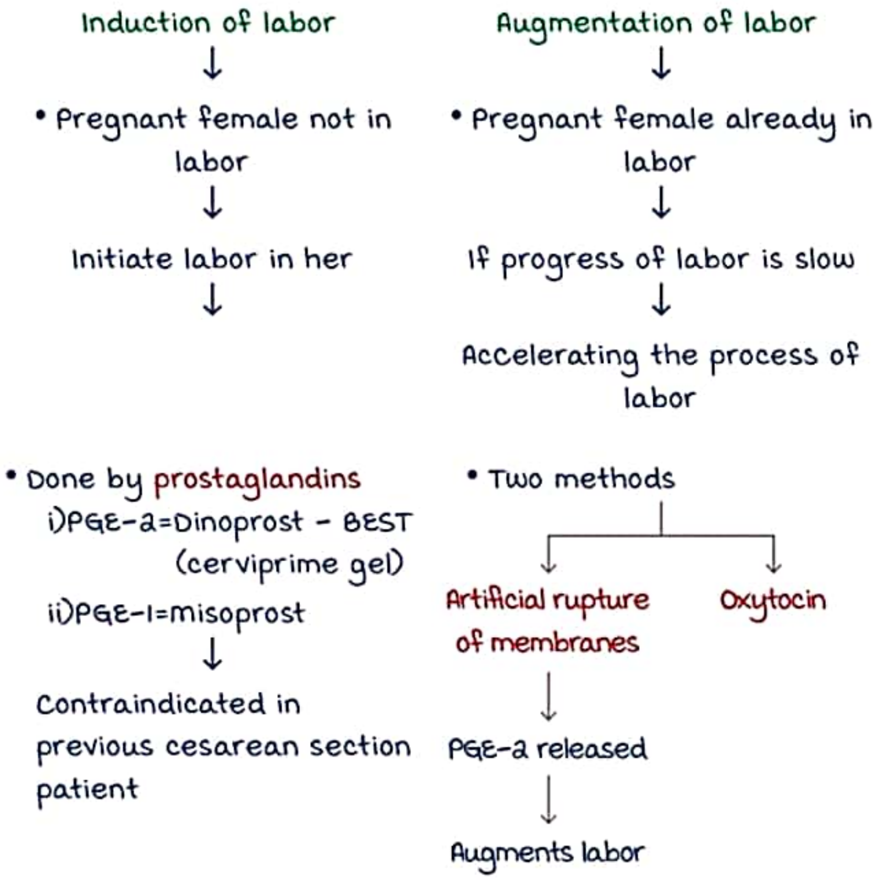
Abnormalities of active phase



Protracted Active phase

- Definition ↓ If dilation or descent is happening at slower rate (less than normal rate)
- Management
  - Rule out ↓ Cephalopelvic disproportion (CPD) ↓ If CPD-is cause ↓ Rx-cesarean section
  - Rule out ↓ Occupito posterior position ↓ If it is the cause ↓ Wait & watch
  - If the cause is neither of them ↓ Augment labor by rupture of membranes and starting oxytocin infusion

Induction of labor and augmentation of labor 00:48:39



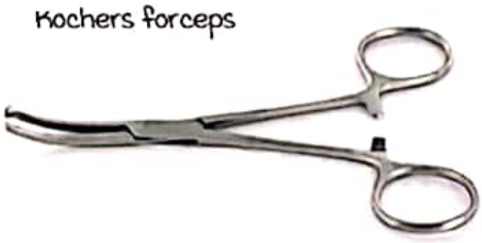
Induction of labor ↓

- Pregnant female not in labor ↓ Initiate labor in her ↓
- Done by prostaglandins
  - i)PGE-2=Dinoprost - BEST (cerviprime gel)
  - ii)PGE-1=Misoprost ↓ Contraindicated in previous cesarean section patient

Augmentation of labor ↓

- Pregnant female already in labor ↓ If progress of labor is slow ↓ Accelerating the process of labor
- Two methods
  - Artificial rupture of membranes ↓ PGE-2 released ↓ Augments labor
  - Oxytocin

Kochers forceps



Contraindications for artificial rupture of membranes 00:52:28

- The membranes – normally, acts as a barrier between vagina and fetus
- membranes – rupture normally at the end of 1st stage (after dilation of cervix dilation)
- Artificial rupture – membranes ruptured before full dilation
- Contraindication
  i) maternal HIV
  ii) Active genital herpes infection
  iii) Intrauterine fetal death
  iv) In chronic polyhydromnios – Simple ARM causes sudden amniotic fluid gush
  ↓
  Causes sudden decompression of uterus
  ↓
  Can lead to detachment of placenta
  ↓
  Abruptio placenta
- So in polyhydramnios – Controlled ARM is done

Active space

Active phase arrest 00:57:04

Active phase arrest
(cervix does not dilate)
↓
Cervix is ≥ 6cms dilated with membranes ruptured

- ↓ Adequate uterine contractions are present and no dilation for 4 hours
- ↓ Adequate uterine contractions are not present, oxytocin given and no dilation for 6 hours

- Diagnosis of arrest, should only be made after membranes are ruptured
- management – Cesarean section

Second stage of labor 01:06:55

- In second stage–fetus gets delivered
- nulliparous – 1 hour
- multiparous – 30 mins
- The second stage of labor – abnormalities
  - ↓ Prolonged
  - ↓ Arrest
- Second stage is said to be prolonged

	If without epidural	With epidural
Nulliparous	2 hrs	3 hrs
multiparous	1 hrs	2 hrs

- management of prolonged stage-2 labor
  - ↓ If station ≥+2 ↓ Forceps
  - ↓ If station <+2 ↓ Cesarean section

- Arrest of 2nd stage – Prolonged second stage + 1hr

	Without epidural	With epidural
Nulliparous	3 hrs	4 hrs
Multiparous	2 hrs	3 hrs

- Second stage arrest-A/K/A obstructed labor
  ↓
  Management – Cesarean section

Obstructed labor 01:12:04

- In obstructed labor
  ↓
  The mother is – Exhausted
  Tachypnea
  Acidotic breathing

- Per abdomen, the uterus in pregnancy – two segments

Upper uterine segment (UUS)	Lower uterine segment (LUS)
↓	↓
Actually contracts & relaxing of labor	Passively dilates at the time of labor
↓	↓
Tonically contracted	Dilated and stretched out

A ring can be palpated between UUS and LUS – called Bandl's ring

- Fetal heart sound – Fetal distress / Absent
- P/V examination – Hot, dry vagina
  Bleeding present
  Hematuria Present
  Fetal head – moulding
  Caput can be felt

- management – Principles
  ↓
  Never wait & watch
  Never give oxytocin
  - Best management – cesarean section + antibiotics

Complication of obstructed labor

↓ Rupture of uterus

↓ Vesico vaginal fistula (VVF)

↓

m.c.c of VVF in developing country – obstructed labor

Bandl's ring and schroeder's ring 01:17:57

Bandl's ring	Schroeder's ring
• Seen in obstructed labor	• Seen if oxytocin used injudiciously
• Pathological ring	• Physiological ring
• Retraction ring	• Constriction ring
• Located at junction of UUS and LUS	• Located at junction of UUS and LUS
• Ring moves upwards (position not fixed)	• Position is fixed
• Can be palpated per abdominally (P/A) but not P/V	• Cannot be palpated P/A but palpated P/V
• management-cesarean section	• management-mostly the ring will automatically disappear ↓ If not ↓ In 1st stage-cesarean section (vertical incision in LUS) ↓ In 2nd stage-depending on station of fetal head forceps delivery or Cesarean section

Active space

Third stage of labor

01:23:23

- Normal duration
  - If passive manangement ↓ 15-25 mins
  - If active manangement ↓ 5-10 mins
- Prolonged 3rd stage of labor ≥ 30 min

  ↓

  Retained placenta
- management-for retained placenta

  ↓

  Oxytocin

  ↓

  If still not delivered
  - Adherent placenta (placenta - accreta, percreta, increta) ↓ Hysterectomy
  - Non adherent placenta (detached from uterus but not delivered) ↓ Manual removal under general anesthesia

Fourth stage of labor

- It is 1 hr observation period after delivery of placenta
- The mother experiences physiological chills

Active space

MECHANISM OF LABOR

- mechanism of normal labor – manner in which the fetus adjusts itself to pass though the parturient canal with minimal difficulty
- 8 cardinal movements of the head in normal labor
  - Every – Engagement (synclitic / Asynclitic)
  - Decent – Descent
  - Female – Flexion
  - I – Internal rotation
  - Choose to – Crowning
  - Employ – Extension
  - Rises – Restitution
  - Extremely – External rotation

Engagement 00:00:37

Normal vaginal delivery
  lie – longitudinal
  Presentation – cephalic
  Presenting part – vertex (mc position is left-occipito transverse)

Engagement: when the largest transverse diameter of the fetal head has crossed the pelvic inlet

Biparietal diameter → Largest transverse diameter

- On per vaginal examination → Station 0 – at level of ischial spine
- On per abdominal examination → ≥ ⅕th of fetal head palpable

Active space

Engaging diameters: Fetal skull

- Transverse
  - Biparietal diameter (BPD) [most cases]
  - Super subparietal diameter
    ↓
    Platypelloid pelvis
- AP diameter
  - vertex
    ↓
    - Suboccipito bregmatic [9.5cm]
  - Brow
    ↓
    - mentovertical [14 cm]
  - Face
    ↓
    - Submento-bregmatic
      ↓
      mentoanterior position
    - Submento vertical
      ↓
      mentoposterior position

Synclitic & asynclytic engagement

00:07:35

Synclitic: Sagittal suture lies midway between pubic symphysis & sacral promontory, i.e:- lies in the transverse diameter of the pelvic inlet

Asynclitic

- Anterior
  ↓
  - Sagittal suture pointing towards sacral promontory
  - MC in multipara
  - A/K/a Naegele's obliquity/ Anterior parietal presentation
- Posterior
  ↓
  - Sagittal suture pointing towards pubic symphysis
  - A/K/a Litzman obliquity / Parietal presentation
  - MC in primigravida

Platypelloid pelvis – engagement occurs in marked asynclitism

Descent: Uterine contraction pushes the head of the fetus

↓

Flexion: Head of the fetus touch the Levator ani muscle, resistance of this pushes fetal head

↓

↓

Head reaches the level of ischial spine,
occiput of fetus touch levator ani,

↓

Internal Rotation : Push the occiput in downward, forward & inward direction. Occiput → Directly behind pubic symphysis → Hart's rule

- Head rotated → 90° (or) 2/8th of a circle
- Torsion in the neck of the fetus ⊕

↓ Uterus contract

Crowning : Head is visible at the introitus – episiotomy is done here if indicated

↓

Extension : Head is delivered by extension

- maximum chances of perineal tear, prevented by supporting the perineum by one hand
- Ritgen / modified-Ritgen manoeuvre : with Right hand bring the chin forward, with left hand give pressure on occiput so that suboccipito bregmatic diameter (9.5cm) is delivered

↓

Restitution : Untwisting of the Neck of the baby

- Occiput of fetus move in opposite direction of internal rotation by 1/8th of the circle (or) by 45°
- Shoulder will come directly behind pubic symphysis

External rotation : Shoulders move inside

- move by 1/8th of a circle
- Outside: Head of the fetus rotate, occiput facing the LOT direction

∴ occiput at external rotation will be facing the same position as it was facing at the time of labor

- Face of the Baby is facing towards mothers Right thigh

↓

Active space

One liners in mechanism of labor 00:30:03

- Delivery of fetal head during normal vaginal delivery is by Extension
  - In breech & face presentation it occurs by Flexion
- MC position at the beginning of the labor = LOT > LOA
- Occiput moves by 2/8th of circle in LOT position & shoulder by 1/8th of the circle
- After external rotation Face of the baby faces towards Right thigh of the mother and occiput towards orginal position from where labor began
- Time for episiotomy: After crowning has occurred

Episiotomy 00:31:50

- Surgically planned incision given on the perineum to facilitate the delivery of fetal head
- Not to be given universally to all females undergoing vaginal delivery – as recommended by WHO
- To prevent perineal tear, WHO doesn't recommend episiotomy, but perineal support at the time of delivery of head of fetus / Ritgen manoeuvre

Indications for episiotomy:

- Baby is big – Macrosomia
- Perineum is Rigid – Primigravida
- Instrumental delivery – Forceps/Vacuum
- Head in breech
- Shoulder dystocia
- Face to pubis delivery

Episiotomy scissors:

- Tip is blunt & is bent at an angle

↓

Prevent fetal head injury

Episiotomy

mediolateral (preferred)	median
- Lot of muscle fibers are cut	- very few muscle fibers are cut
- Bleeding ↑	- less bleeding
- Difficult repair	- Easy repair
- Slow healing	- Healing is faster
- more dyspareunia	- Less dyspareunia
- Can never involve anal sphincter → Preferred	- If it extents, can involve anal sphincter → Not preferred
- Vaginal mucosa + muscles are cut → Equivalent to 2° perineal Tear	- Here only vaginal mucosa is cut = Equivalent to 1° perineal Tear

Active space

THIRD STAGE OF LABOR & ATONIC PPH

Third stage of labor 00:00:51

- Begins after the delivery of the baby & ends at delivery of placenta
- Plays crucial role in PPH
- Can prevent PPH if managed properly
- Average duration = 15-20 min
- If 3rd stage ≥ 30 min = Prolonged 3rd stage / Retained placenta
- Can be managed

Passively ↓

- Human placenta is deciduate, it has to shed off after delivery
- Waiting for spontaneous expulsion of placenta
- Duration = 15-20 min
- Changes of PPH & maternal mortality ↑

Actively ↓

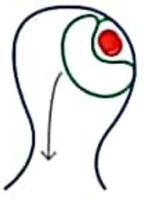
AMTSL
(Active management of Third Stage of Labor)

- Duration = 5-10 min
- Bleeding ↓
- PPH & maternal mortality ↓
- Best method to prevent PPH = AMTSL

Main event in 3rd stage of labor: Delivery of placenta

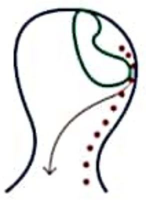
Methods of placenta delivery 00:05:14

- Schultz method



- Placenta starts separating from centre

- Duncan method



- Placenta starts separating from periphery

• Retro placental clot is formed ↓ (clot is hemostatic) ↓ Blood loss	• No retroplacental clot formed
• Bleeding is evident only after entire placenta has separated	• Bleeding is evident as soon as placenta separates
• Shiny fetal side of the placenta - comes out first (Schults - shiny)	• Dull maternal side of the placenta - comes out first (Duncan - Dull)
• mc method	• Less common method

- Important factor responsible for placental separation is uterine contractions
- In all cases of retained placenta - 1st management :
  ↑ uterine contractions - Oxytocin
  [but methergine & prostaglandin not recommended]
  ↓ If placenta is still retained
  Manual removal of placenta (in OT - G/A)
  ↓ Cannot find the plane between placenta & uterus
  Morbidly adherent placenta
- Line of separation of placenta - Lies along zona spongiosa
- Living ligature: middle layer of myometrium - has fibres crisscross manner with blood vessels in between them. When uterus contracts → Blood vessels gets constricted.
  ∴ Atonic uterus is mcc of PPH
- Height of the uterus immediately after delivery: Just below the uterus with 20 weeks of pregnancy

Signs of placental separation 00:16:39

- Sudden gush of blood per vagina
- Supra pubic bulge
- Height of uterus ↑ slightly
- Apparent lengthening of the cord - Permanent
- Most important sign - Feel the placenta in vagina > Lengthening of the cord

Steps in AMTSL

00:19:25

Step 1 – Administer a uterotonic agent within 1 min of delivery of the baby (most important)

Step 2 – Delayed cord clamping

Step 3 – Deliver placenta by Controlled cord traction / modified Brandt Andrews technique

Step 4 – Intermittent assessment of uterine tone → By doctor [earlier – uterine massage]

Step 1 : Administer a uterotonic agent

<table>
<tr><th>Drug</th><th>Dose</th><th>Important points</th></tr>
<tr>
<td>• Oxytocin
– Only drug recommended by WHO → 1st line drug to prevent PPH

Phsysiological contraction
↓
Can be used during labour to augment contractions</td>
<td>10 IU
(I/m or I/v infusion)
– Never given IV bolus
– If given IV bolus
↓
• Hypotension
• Cardiac arrest
– Mechanism of Action :
• Calcium influx
• Releases PGF 2α
⇓
– Upper uterine segment contract
– Lower uterine segment passively dilate
– On & off contraction of uterus – to maintain fetal blood flow</td>
<td>• Natural Oxytocin
↓
Nonapeptide
• Synthetic Oxytocin
↓
Octapeptide
• Natural oxytocin synthesized by : Paraventicular nucleus of hypothalamus
• Stored in posterior pituitary
• t½ = 3 – 5 min
• Can be given :
<table>
<tr><th></th><th>I/m</th><th>I/v infusion</th></tr>
<tr><td>Onset of Action</td><td>3min</td><td>Immediately</td></tr>
<tr><td>Duration Of action</td><td>3hrs</td><td>1hr</td></tr>
</table>
• Leads to milk ejection
• 1st line drug recommended by WHO</td>
</tr>
</table>

• methyl ergometrin ↓ aka Ergometrine, methergine Oxytocin can be used	0.2mg I/m - Contraindications: T - after the delivery of first twin O - Organic heart disease P - Pre - eclampsia E - Eclampsia R - Rh incom-patibility	mechanism of Action: ↓ Tetanic Contraction • Cannot use it at the time of labor • Phototoxic ↓ Vials are brown in colour • In HIV - if used with protease inhibitors → Hypertension • Never given IV → Hypertension
• Syntometrine	5U oxytocin+ 0.5mg methylergometrine	• Not readily avail-able, expensive, highly potent
• Carbitocin	100mcg - slow IV ↓ Prevent PPH	• Synthetic Oxytocin • Octapeptide • T½ → 85- 100 mins
• PGE$_1$ ↓ misoprost (Not best drug)	600 mcg - Oral	• Side effect - • hyperthermia • Chills ⇓ Dose dependent • Not contraindicated in asthmas • Contraindicated in previous Cesarean section patients

• PGF – 2 α ↓ Carboprost – Hembate (Best drug to prevent & treat PPH)	250 mcg – I/m	• Side effect – Diarrhoea • Contraindication – Asthmatics – Suspected amniotic fluid embolism
• Dinoprostone ↓ (PGE2) Off label – Not Recommended by WHO	20 mg suppository per – rectal	

AMTSL : Step 2 & 3

00:45:50

- Delayed cord clamping → ≥ 1 min to 3 min
  - 80ml of blood in cord (≃ 50mg of iron) → Baby

    ↓

    Prevent neonatal anemia

- Indications for Early cord clamping: (< 1 min)
  - Birth asphyxia
  - Neonate needs resuscitation
  - Baby is a diagnosed case of heart disease
  - Rh –ve pregnancy
  - In HIV ⊕ females – According to NACO

  } Not a part of AMTSL

- Delivery of placenta by controlled cord traction or by modified Brandt Andrews Technique
- make sure placenta is separated → Otherwise uterine inversion

Uterine inversion

00:51:11

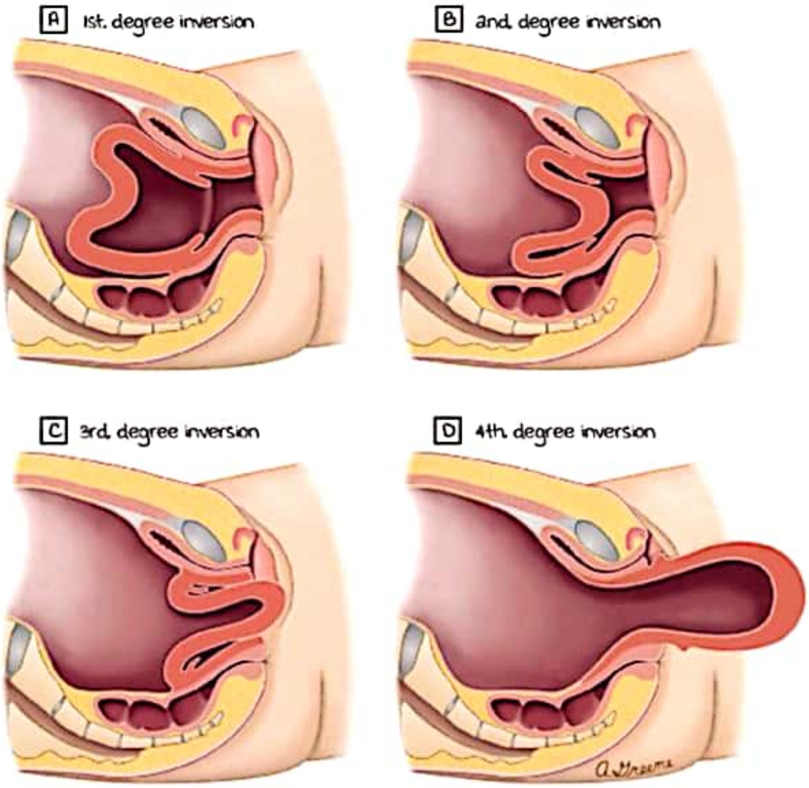
- mcc – mismanaged 3rd stage of labor
- Patient immediately goes into shock (Neurogenic shock)

  ↓

  Later on there is Hemorrhagic shock

- mcc of death here: Hemorrhagic shock

- Degrees of uterine inversion


A 1st. degree inversion
B 2nd. degree inversion
C 3rd. degree inversion
D 4th. degree inversion

1st degree : Fundus is within endometrial cavity above the level of internal OS

2nd degree : Fundus reaches upto internal OS or below it

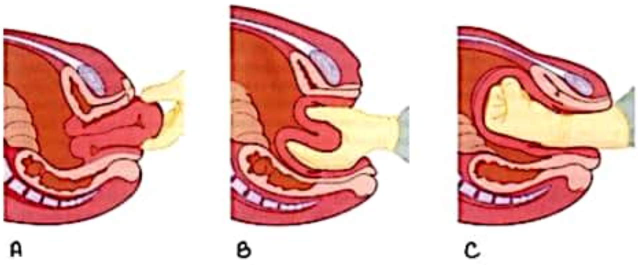
3rd degree : Fundus reaches upto external OS or below it

4th degree : Entire uterus is lying outside introitus

- Classification of uterine inversion based on duration of labor :
  - Acute inversion : within 24 hrs of labour
  - Subacute inversion : After 24 hrs but within a month of delivery
  - Chronic inversion : ≥ 1 month of delivery

Management of uterine inversion :

- Resuscitate patient
- Stop uterotonic drugs
- Do not attempt to remove placenta
- Attempt Inversion manually (Johnson method)



↓ unsuccessful

Vitals of patient unstable → Immediate surgical management

Vitals stable → Give uterine relaxant → (Terbutaline/Nitro glycerine) → Try to reposition uterus manually → O Sullivan's hydrostatic method → Unsuccessful → do surgery:

- Mc - Huntington method
- Other methods -
  - Haultain
  - Spinelli
  - Kustner

- Whenever correction of inversion is successful → Start uterotonic drug → Await spontaneous expulsion of placenta

AMTSL : Step 4

00:59:21

- Patient after delivery goes into shock - most probable cause - PPH
- Patient goes into shock immediately after delivery : most probable cause - Uterine Inversion
- Patient goes into unexplained shock after delivery : most probable cause - Amniotic fluid embolism

Step 4 : Intermittaent assessment of uterine tone

Not a part of AMTSL :

- Early cord clamping
- IV ergometrin
- Uterine massage

Postpartum hemorrhage

01:03:15

- Blood loss in, Vaginal delivery → < 500ml
  Cesarean section → < 1 lts
  Twin delivery → <1 lts
  Cesarean Hysterectomy → < 1.5 lts

- In any case blood loss more than expected values in 24hrs of delivery or upto 12 weeks of delivery
- ACOG : Blood loss ≥ 1000ml irrespective of mode of delivery
- Bleeding is accompanied by signs & symptoms of hypovolemia within 24 hrs of delivery irrespective of route of delivery

} PPH

ATLS (Advanced Trauma Llife Support) – Classification of PPH

- Class I – blood loss → < 15%
- Class II – blood loss → 15 – 30%
- Class III – blood loss → 30 – 40%
- Class IV – blood loss → ≥ 40%

- Classification of PPH :
  - Primary PPH
    ↓
    Within 24hrs of delivery
    - mcc – Atonic uterus
  - Secondary PPH
    |
    After 24hrs but before 12 weeks of delivery
    ↓
    mcc – Retained placental tissue

- Overall mcc of PPH – Atonic uterus
- Causes of PPH → 4T's
    - 1st T = ↓ Tone of uterus (mc)
    - 2nd T = Trauma (2nd mc)
    - 3rd T = ↓ Thrombin (bleeding disorder)
    - 4th T = Tissue (Retained Placental Tissue)

Factors predisposing to Atonic uterus:

1) Over distension of uterus :
    - Twins
    - Polyhydramnios
    - macrosomia (diabetes)
    - Grand multipara (> 5 delivery)
2) Prolonged labor
3) Precipitate labour [onset of labor to expulsion of fetus ; Time = 3 hrs]
4) Prolonged Oxytocin
5) Chorioamnionitis
6) Previous history of PPH
7) Antepartum hemorrhage
8) Adherent Placenta
9) Fibroid uterus – surface area of uterus ↑

* Hypertension deoes not lead to PPH

Placental anomalies that can lead to PPH :

- Placenta Succenturiata
- Placenta Bilobata
- Placenta Spuria

Management of PPH

1:13:29

- Step 1: Resuscitation of patient
- Secure a large bore I/V line
- IV fluids (Crystalloids)
- Catheterize bladder
- Blood grouping, Hematocrit, Coagulation profile

- Arrange for blood
  ↓

Shock Index : Helps to determine when to transfuse blood.

- $\frac{HR}{SBP}$ = Shock index
- Ⓝ → 0.5 to 0.7
- In pregnancy → 0.6 to 0.8
- If shock index = ≥ 0.9 to 1.1 → Indication for blood Transfusion

- Step 2: Distinguish between Atonic PPH & Traumatic PPH
  - Abdominal examination

Uterus cannot be Palpated → Atonic PPH

Uterus can be Palpated → Traumatic PPH

Management of atonic PPH

1:17:41

Step 1 :

- Give uterotonic drug
- WHO recommended drug = Oxytocin + Do uterine massage simultaneously
- Dose of Oxytocin – 30 – 40 IU as IV infusion in NS or RL

[Not in 5% Dextrose, as in PPH Oxytocin has to be given for a longer time ∴ we cannot use electrolyte deficient media, It can lead to volume overload & Hyponatremia]

- if oxytocin is not available – WHO recommended
  - methyl ergometrine : 0.2 mg – dose → I/m
    Repeated = 2 – 4hrs
    maximum = 5 dose
  - Syntometrine : 5U + 0.5 mg
    5U ↓ Oxytocin
    0.5 mg ↓ methyl ergometrin

- PGE_1 (misoprost): 800mcg – sublingually
  Per – Rectal → Dose 1000mcg (Not WHO recommended)
- Carboprost ($PGF - 2\alpha$): 250mcg I/m
  Repeated – 15 – 90min
  max dose → 8 (ie: 2mg)
- Inj. Tranexamic acid : 1gm I/V (slow over 20mins)

Management of PPH – Recommended by WHO :

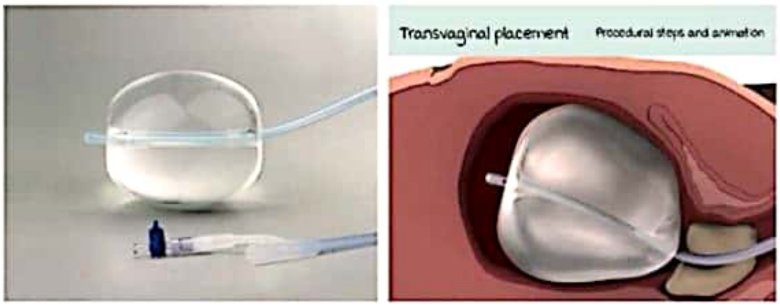
1st Drug → Oxytocin with simultaneous uterine massage & give Inj.Tranexamic acid
↓
Bleeding doesn't stop
↓
methylergometrine
↓
Carboprost (Best drug to prevent & treat PPH)
medical management should be tried only for 30mins
↓
If it fails
↓
Do mechanical methods

- mechanical methods :

Recommended by WHO
↓
- Uterine massage
- Sengstaken – Blakemore esophageal catheter
  Or
- Bakri Balloon Catheter
  Or
  Condom Catheter

Not Recommended by WHO
↓
Uterine packing

Bakriballoon catheter → Fill it with warm NS → 300 –500 ml
↳ maximum capacity is 500ml


Transvaginal placement
Procedural steps and animation

Temporary method recommended by WHO for PPH :

- Done as we wait for help or in transit to higher centre
- Bimanual compression of uterus
- External compression of aorta
- use military anti shock garment /treatment

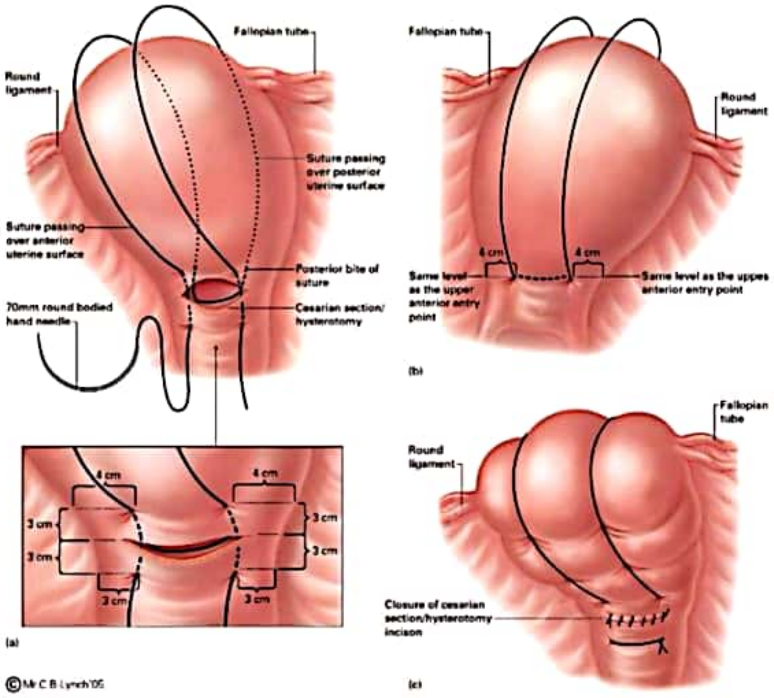
If mechanical methods fail → Surgical methods

Surgical methods:

- Compression sutures :

1) B- lynch sutures : mc

When you tighten the sutures
↓
Anterior & posterior wall of uterus will meet
↓
Bleeding steps


Fallopian tube
Round ligament
Suture passing over posterior uterine surface
Suture passing over anterior uterine surface
Posterior bite of suture
70mm round bodied hand needle
Cesarian section/ hysterotomy
4 cm
4 cm
3 cm
3 cm
3 cm
3 cm
3 cm
3 cm
(a)
Fallopian tube
Round ligament
4 cm
4 cm
Same level as the upper anterior entry point
Same level as the uppes anterior entry point
(b)
Fallopian tube
Round ligament
Closure of cesarian section/hysterotomy incison
(c)

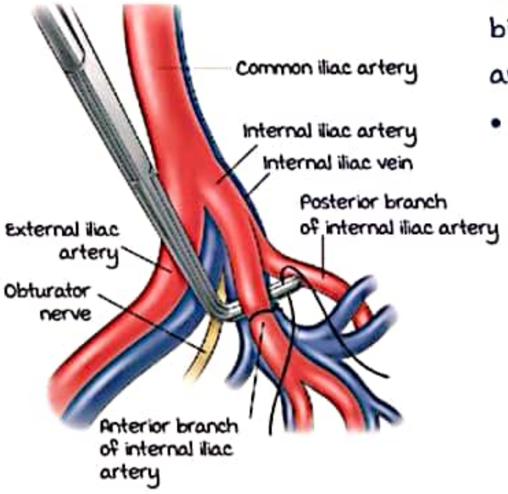
© Mr C B Lynch'05

Active space

a) Other sutures :

- Haymann suture – No need to open uterine cavity
- Cho square suture – Sutures in form of squares
- Gunshella suture

- Bilateral ligation of Arteries supplying uterus :
  - Uterine artery → Site : at the level of internasl os
  - Ovarian artery
  - Anterior division of internal Iliac artery ↓ Site : 5cm below the bifurcation of common iliac artery
    (Posterior division → Lower limb)
    - Pulse pressure ↓ by 80%


Common iliac artery
Internal iliac artery
Internal iliac vein
Posterior branch of internal iliac artery
External iliac artery
Obturator nerve
Anterior branch of internal iliac artery

If bleeding is still not controlled → Hysterectomy
↓
Supracervical / Subtotal Hysterectomy)
(only uterus removed , Not cervix)

2nd Best – Total Abdominal hysterectomy (remove uterus + cervix)

If bleeding is still not controlled
↓
Apply pelvic pressure packs
→ Umbrella pack
→ Parachute pack

TRAUMATIC POST PARTUM HEMORRHAGE (PPH)

Causes of traumatic PPH 00:00:14

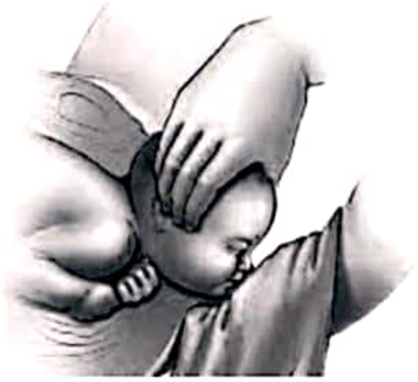
- Perineal tear
- Cervical tear
- Hematoma
- Rupture of uterus

Perineal tear

- A tear which involves perineum
- Classification of perineal tear
  - 1st degree → When vaginal mucosa / Skin are torn
  - 2nd degree → 1st degree + vaginal muscles are torn
  - 3rd degree → Anal sphincter is involved
    - A: < 50% of external anal sphincter tear
    - B: ≥ 50% of External Anal Sphincter tear
    - C: External anal Sphincter + internal anal sphincter tear
  - 4th degree → 1st + 2nd + 3rd + Rectal mucosa tear
- 3rd degree and 4th degree tear – Complete perineal tear

methods to prevent perineal tear

Recommended by WHO	Not recommended by WHO
• No routine episiotomy ↓ • modified Ritgen maneuver i) manually supporting the perineum with Right hand while delivering the head of fetus ii) Deflexing head of fetus with left hand • Advise patient not to bear down while delivering the head	• WHO does not recommend episiotomy in all females undergoing vaginal delivery ↓ • RCOG recommends ↓ Warm compress to be applied to perineum to ↓chances of tear



modified Ritgen maneuver

Management of perineal tear

00:06:55

- Time to repair 3rd and 4th degree tear
  - If recognized within 24 hrs of delivery
    - ↓ Immediate repair
  - If recognized > 24 hrs of delivery
    - wait for 2 weeks
    - Repair after infection and inflammation subsides

Technique of repair

↓

1st & 2nd degree tear
↓
Done in labor room under Local anesthesia
↓
Steps

1st – Suture vaginal mucosa (continuous suture – using vicryl/polyglactin)
2nd – Suture muscles (Interrupted sutures)
3rd – Vaginal Skin (mattress Suture)

3rd or 4th degree tear
↓
Done in OT under general anesthesia
↓
Steps
↓
1st – Repair rectal mucosa
2nd – Internal anal sphincter (End to End anastomosis)
3rd – External anal sphincter

m/c → End to End Anastomosis

Best → Over lapping Technique

4th – Then repair the 1st & 2nd degree tear
↓
1st – Vaginal mucosa,
2nd – muscles
3rd – Vaginal Skin

Important points after repair

i) Pregnancy should be avoided for an year (ideally) but for atleast 6 months after 3rd /4th degree repair

ii) In future these females can have vaginal delivery

iii) ACOG recommends a single shot of antibiotic at the time of repair

Cervical tear

m/c site → 3'o clock > 9'o clock Position

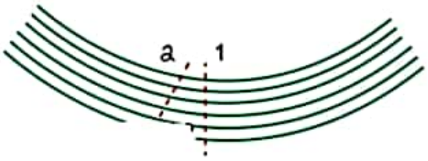
management → Repair the tear

Episiotomy

00:11:44

Definition – It is a surgically planned incision given on posterior wall of vagina to facilitate the delivery of fetal head

→ Episiotomy Scissors
Bent and with
Blunt edges



1 – median episiotomy
2 – mediolateral episiotomy

- Types of episiotomy
  - median episiotomy
  - mediolateral episiotomy

Active space

Median and mediolateral episiotomy

00:15:00

median	mediolateral
• The Levator Ani muscle is thick in the periphery and thin in centre ↓ So less muscles are cut ↓ Less bleeding ↓ Repairing - is easy ↓ Healing is fast ↓ Dyspareunia is less • Disadvantage - If it extends it Can involve the anal sphincter(3rd or 4th degree perineal tear) It can lead to fecal incontinence • It corresponds to Ist degree Perineal tear	• Even if it extends, it can never involve anal sphincter • Disadvantage - more muscles are cut ↓ Bleeding ↑ ↓ Repair is difficult ↓ Healing is slow ↓ Dyspareunia is more • It corresponds to 2nd degree perineal tear

Indications for episiotomy

00:22:11

1) Rigid perineum (in primigravida females)
2) Shoulder dystocia
3) macrosomia
4) If delivering after coming head of breech
5) Instrumental delivery (Forceps / vaccum)
6) Face to pubis delivery
7) Suspecting Perineal tear

Hematoma

00:24:01

- m.c site of pelvic hematoma ↓ Vulval hematoma
- m.c artery to form vulval hematoma ↓ Pudendal artery
- m.c artery to form vaginal hematoma ↓ uterine artery
- m.c symptom ↓
  - Pain
  - Difficulty to pass urine

On Local examination ↓

- Bluish coloured swelling

management ↓ Conservative

- Ice pack
- Analgesics

Indications for surgical management

1) Patient is hemodynamically unstable (shock)
2) Size of hematoma increasing (≥ 5 cms)
3) Excruciating pain (it indicates hematoma has extended to muscles)

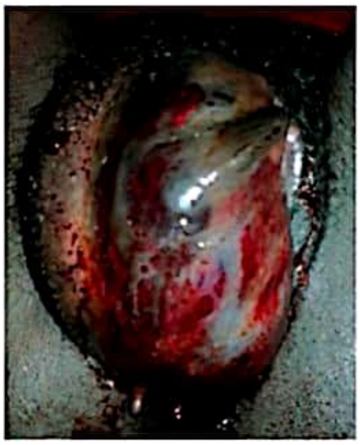
Surgical management

- Drain hematoma
- if any active bleeder is present ↓ Close by figure of '8' Suture
- Obliterate the cavity of hematoma

- In case of broad ligament hematoma

↓

Immediate Laparotomy



Rupture of uterus

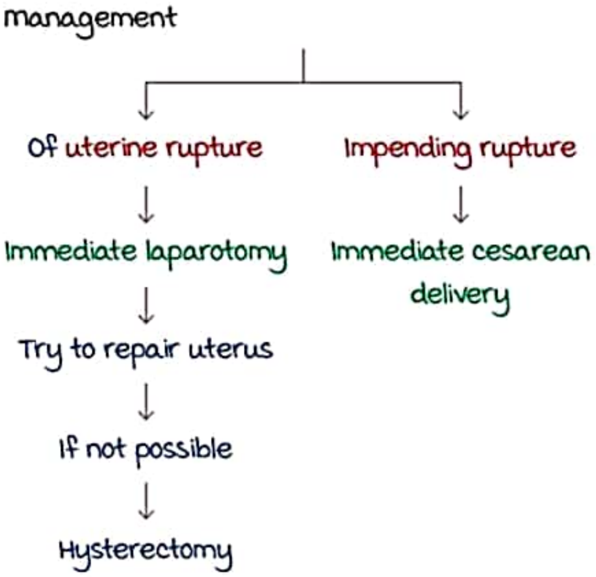
00:28:07

- m.c.c
  - ↓ Previous cesarean section
- m.c.c in non scarred uterus
  - ↓ Obstructed labor
  - ↓ Other causes
    - i) Grand multipara
    - ii) mullerian malformation
- Sign of impending rupture
  - ↓ Fetal tachycardia
  - ↓ So monitor
    - • Fetal heart rate
    - • Check for Scar tenderness
- Sign of Rupture
  - ↓ • Fetal bradycardia

- Other signs of uterine rupture

↓

i) maternal Tachycardia
ii) maternal hypotension
iii) Feel fetal parts superficially
iv) Uterus contraction – lost
v) Hematuria
vi) Fresh vaginal bleed
vii) Loss of station – per vaginally


management
Of uterine rupture
Impending rupture
Immediate laparotomy
Immediate cesarean delivery
Try to repair uterus
If not possible
Hysterectomy

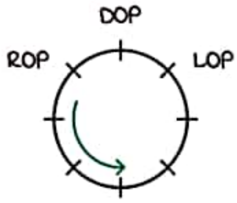
Active space

OCCIPITO – POSTERIOR POSITION & MALPRESENTATION

Introduction 00:00:05

- At the onset of labor – Only 10% of fetus are in Occipito-Posterior [OP] position
- Late stage of labor – Only 2% are in Occipito posterior position [Reason – 80-90% cases rotate and become occipito-anterior]
- Etiology of Occipito posterior position
  i) most common cause – Idiopathic
  ii) 2nd most common cause – Anthropoid & android pelvis
  iii) more common in nulliparous females
  [OP-position is a malposition not a malpresentation]

  All malpresentations are common in multipara
- Occipito posterior positions
  (ROP) Right OP > Direct OP (DOP) > Left OP (LOP)
  [most common] [least common]
- Mechanism of Labor
  i) In 90% cases, normal delivery occurs, as the head rotates 3/8th of a circle



  ii) Hence, best management of OP position when diagnosed during labor → wait & watch
  iii) During rotation of head occipito posterior → Occipito-anterior ⇒ Vaginal delivery
  iv) Sometimes, Head of Fetus starts to rotate
  ↓
  Reaches occipito-transverse
  ↓
  Ceases rotation [no further rotation]
  ⇓
  Incomplete forward rotation

  [Reason – Prominent ischial spine]

Active space

Deep tranverse arrest

00:06:20

- Fetal Head – At occipito – transverse position for an hour despite good uterine contractions

⇓

Deep transverse arrest

- Occurs at the level of ischial spines
- more common with android pelvis
- management of Deep transverse arrest

Android pelvis
↓
Caesarean section

Other pelvis
1. Vaccum delivery
2. manual rotation of head followed by forceps delivery
3. Kielland forceps [outdated]
4. Caesarean section
↓
Best management

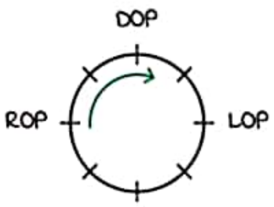
Direct occipito posterior position

00:10:54

- Rarely, If the head of fetus rotates posteriorly

⇓

Direct occipito posterior position



- more common with Anthropoid pelvis
- [AP diameter > Transverse diameter]

Active space

- management of DOP

Anthropoid pelvis
↓
Vaginal delivery can occur
↓
Known as Face to pubis delivery

Any other pelvis
↓
fetus cannot be delivered and if fetus remains in that position for ≥ 30 mins
↓
Known as Deep sacral arrest
↓
Cesarean section

Transverse lie

00:14:20

- Lie – transverse
- Presentation – Shoulder
- Dorsum of fetus

Dorso-anterior

Dorso-posterior

- most common cause-prematurity > platypelloid pelvis > multiparity
- No mechanism of labor
- management
  i) Always cesarean section [Despite baby being alive or dead]
  ii) Chances of cord prolapse is high with transverse lie
  iii) If transverse lie is recognized during pregnancy External cephalic version is tried

External cephalic version

00:16:07

- OPD procedure
- No anaesthesia required
- Should be done under continuous fetal monitoring
  - Fetal distress → Indicates cord around the neck
  - Immediate steps:
    i) Abandon the procedure
    ii) Rotate the fetus back to its original position

Active space

- If the cord gets
  - Detangled ⇓ Continue ECV
  - Remains entangled ⇓ Take up for cesarean section

- Indications for ECV
  i) Breech
  ii) Transverse lie

- Procedure
  Rotation of fetus per-abdominally
  ↓
  Convert to cephalic presentation

- Pre-requisites for ECV
  i) Period of gestation ≥ 36 weeks [lung maturity]
  ii) Adequate Liquor·
  iii) membranes intact
  iv) Can be done in early labor if membranes are intact
  v) There should be no contraindications for vaginal delivery

- Contraindications for ECV
  - Absolute
    - Precious pregnancy [Eg: pregnancy after 10 years of infertility, women with heart disease]
  - Relative
    - Previous cesarean section

Face and brow presentation

00:25:04

I. Face presentation

- Presenting part is face
- Attitude is abnormal
  Normally → Flexion of head
  Face presentation → Extension of head
- Denominator is Chin / mentum

- Commonest position is left mentoanterior [LMA]
- more common in multiparous females
- most common type of pelvis involved is platypelloid pelvis
- most common cause is anencephaly
- Engaging diameter in mento anterior is submento bregmatic diameter
- Management of face presentation
  - Denominator is mentum

Position: mento anterior (most common-LMA) ↓ Vaginal delivery possible

mento posterior ↓ Only cesarean section

- Face presentation – Vaginal delivery
  - Delivery of face → Flexion
- Normal vaginal delivery
  - Delivery of face → Extension

2. Brow presentation

   i) No mechanism of labor

   ii) management
   - Caesarean section
     [Reason-engaging diameter is mentovertical (14cms)]
   - Per-vaginal examination
     Anterior fontanelle and supra-orbital ridges are felt

3. Mandatory cesarean section – indications
   1. Transverse lie
   2. Brow presentation
   3. Face presentation – mentoposterior position

Per-vaginal differentiation

Face	Breech
1. Alveolar margins-hard	1. Anus – soft
2. Sucking effect ⊕	2. No sucking effect
3. No meconium	3. meconium ⊕
4. 3 bony prominences forming Triangle [mouth + 2 malar prominence]	4. 3 Bony prominences forming straight line [2 ischial tuberosities + anus]

BREECH

Introduction:

- M.C malpresentation: Breech
- In Breech:
  - Lie: Longitudinal
  - Presentation: Podalic

Incidence of Breech:

- At 28 weeks: 20%
- At 34 weeks: baby spontaneously rotates: 5%
- At term: 3-4%
- MCC of Breech: Prematurity
- MCC of Recurrent Breech: Uterine malformation

Types of Breech

Breech

- Thigh flexed Knee flexed → Flexed breech → P/V : feet + Genitalia + Buttocks
  - MC in multigravida
  - Chances of cord prolapse = 6%
- Thigh flexed Knee extended → Frank breech → P/V: Buttocks + Genitalia
  - MC in primi
  - Least chances of cord prolapse
- Thigh extended Knee flexed → Knee presentation → C-section
- Thigh extended Knee extended → Footling → Maximum chances of cord prolapse → C-section

- Over all max. chance of cord prolapse: Transverse lie > footling > Knee
- If head of the fetus is extended in breech → Stargazer breech → C-section

Management of Breech:

1. If breech patient comes in pregnancy at ≥ 36 weeks and No C/I to ECV

↓

do ECV in OPD at ≥ 36 weeks

2. If breech comes at labor

↓ C-section

↓ Arrested breech delivery

↓ Breech extraction

Indications for C-section for breech

00:09:43

1. Footling / Knee presentation
2. Stargazer breech
3. Preterm breech (Baby wt < 1.5kg) and ECV is avoided
4. Post term breech (Baby wt ≥ 3.5kg + >40 weeks)
5. First twin – breech presentation
6. Breech with previous C-section
7. Breech with any other complication of pregnancy – Placenta previa, PIH
8. Breech score 3 or less
9. Primi with breech-relative indication

Assisted breech delivery

- The breech is allowed to deliver spontaneously upto umbilicus and then assistance is given for delivery of shoulder and head
- Delivery happens due to efforts (push of mother) + assistance of obstetrician
- MC type of vaginal breech delivery

Breech extraction

- mother is ↓ GA – No efforts (push) by mother
- The entire delivery is done by obstetrician using manoeuvres
- Only indication: Successful internal podalic version in transverse lie of 2nd twin

Assisted breech delivery 00:14:38

- Lie: longitudinal
- Presentation: Podalic
- Denominator: Sacrum
- MC position: LSA (left sacro-anterior)
- Induction and Augmentation (by oxytocin or ARM) should be avoided
- Any delay in 1st stage or 2nd stage of labor should be taken as CPD → C-section
- In breech
    - Make patient nil orally → Give IV fluids
    - Patient should be lying as much as possible, because ambulation can lead to rupture of membranes and cord can prolapse
    - Meconium staining can be normal in breech as long as FHS is normal
    - Do continuous FHR monitoring by cardiotocogram
    - Epidural analgesia can be given for pain relief

Mechanism of breech delivery 00:19:08

- 1st part delivered in breech: Buttocks
- Engaging diameter: Bitrochanteric diameter (10 cm)
- In RSA position: Buttocks engage in Rt. Oblique diameter
- When buttocks distend the perineum i.e climbing up of perineum
  ↓
  Give episiotomy
- Buttocks lie in AP diameter during internal rotation such that from RSA, sacrum goes to RST (Right Sacro Transverse)
- Breech is the only exception where denominator (sacrum) does not lie directly lie behind the pubic symphysis during delivery
- Savage technique: Spontaneous delivery of baby till level of umbilicus
  ↓
  Wrap a towel around baby's body to prevent cord exposure this is called as savage technique
  ↓
  Shoulder Delivery

Active space

In shoulder delivery:

- Engaging diameter: Bis acromial diameter – 13 cms

Lie along Rt oblique diameter of pelvis

↓

Shoulder comes into anteroposterior diameter
(for this anterior shoulder turns clockwise by 45°)

↓

Anterior shoulder gets delivered first followed by posterior shoulder

↓

Restitution of shoulder by 45° in anticlockwise direction

↓

Delivery of head (After coming Head)

Buttocks and shoulder lie in same oblique diameter, Head in opposite oblique diameter

Delivery of After coming Head:

- Engaging diameter: Suboccipitofrontal diameter

Lie along left oblique diameter of pelvis

↓

Occiput moves anteriorly towards and behind the public symphysis

↓

Delivery of Head in flexed position

Manoeuvres used in breech delivery

00:34:32

For delivery of Buttocks:

- Delivery of buttocks occurs spontaneously
- Only if spontaneous delivery of buttocks is not occurring:

↓

Groin traction (in flexed breech)

(or)

Pinard manoeuvre (unlocking the popliteal fossa in frank breech)

Delivery of shoulders:

Shoulders not in AP Diameter

↓

Hold the back of the baby and turn the shoulders in the Anteroposterior Diameter

↓

most of the times, delivery happens spontaneously after this manoeuvre

↓ if not

Rotate the baby so that the posterior shoulder becomes anterior and the delivery happens ↑ lovset's manoeuvre, Deliver the anterior shoulder in the same manner. While rotating the baby, the back should always be anterior

For delivery of head:

1. Once shoulder gets delivered

↓

Allow the baby to hang by its own weight

↓

When nape of neck is visible → Give suprapubic pressure (promotes flexion of neck)

↓

Hold the legs of the baby, turn it towards mother's abdomen

↓

Head of the baby gets delivered

Burns marshall technique

2. Let the body of the baby rest on the hand

↓

Fingers of left hand on either side of cheeks

↓

Right hand → one finger each on either shoulder of baby, middle finger on occipital protruberance

↓

Shoulder traction and malar flexion

↓

Mauriceau smellie veit technique

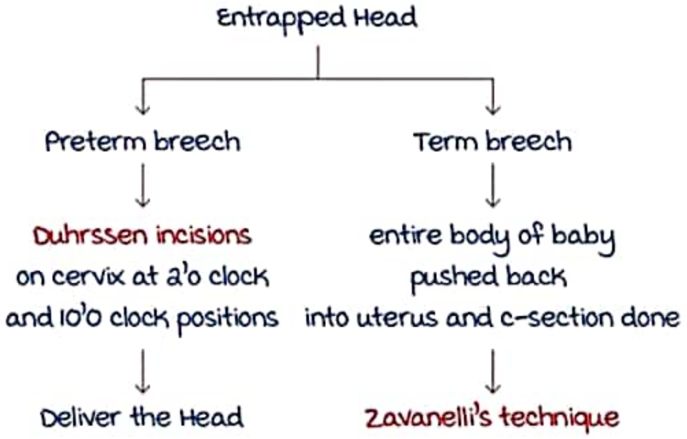
Wigand technique → no shoulder traction. one finger each of left hand on either cheek of baby, one finger in mouth. Suprapubic pressure → delivery of head by flexion

3. Delivery of Head by Forceps

- Forceps used: Neville Barney forceps, Das forceps } In India
- Overall special forceps used: Piper's forceps

Entrapped head

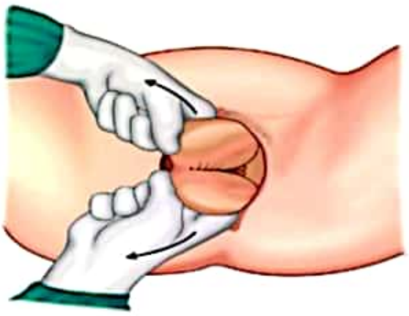
00:46:30


Entrapped Head
Preterm breech
Term breech
Duhrssen incisions on cervix at 2'o clock and 10'o clock positions
entire body of baby pushed back into uterus and c-section done
Deliver the Head
Zavanelli's technique

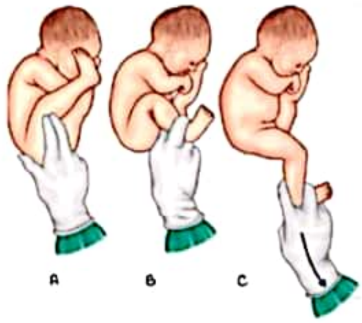
- Normal position in breech – dorsoanterior (back facing the pubic symphysis)

In dorso posterior breech (back of baby facing sacrum)
↓
Delivery of the head is done using prague's manoeuvre

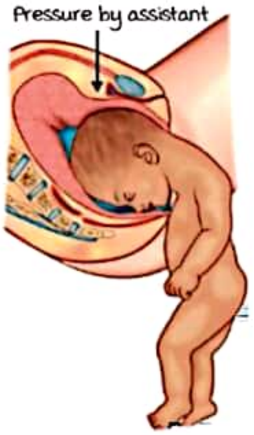
Groin traction

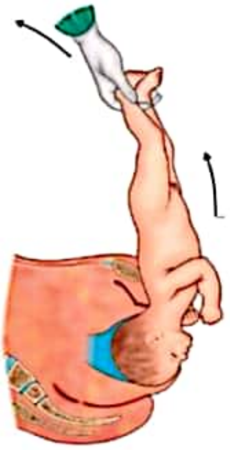


pinard manoeuvre

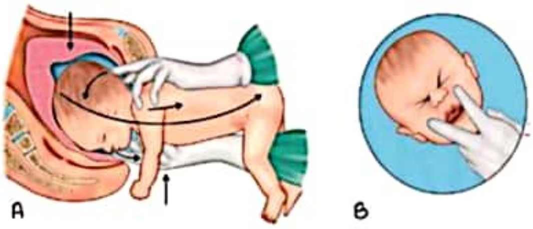


Burns marshall


Pressure by assistant



Mauriceau smellie veit technique



Active space

IMPORTANT POINTS ON LABOR

Pain during labor / labor analgesia 00:00:36

- In early stages of labor: Pain due to uterine contractions
  - Nerve supply of uterus: T_{10}-L_1 – pain in these segments
- In later stages of labor: Pain due to dilation of cervix
  - Nerve supply of cervix: S_2-S_4
- For painless labor
  - Block: Epidural analgesia
  - DOC: Bupivacaine
- For Caesarean: Level of anesthesia given at T_4 segment
- For instrumental delivery (Forceps / Vacuum):

Pain is due to stretching of the vulva

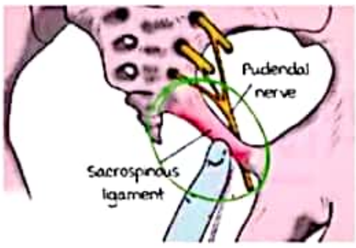
↓

Supplied by Pudendal nerve (S_2-S_4)

↓

Pudendal nerve block is done for Instrumental delivery

- Site for pudendal nerve block: Ischial spine
- Ligament pierced during pudendal block: Sacrospinous ligament
- Direction of needle: Postero medial



Phases of parturition 00:06:34

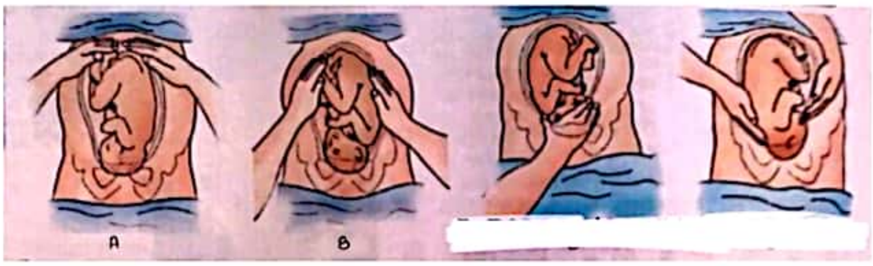
- Phases of parturition ≠ stages of labor

Phase 1	Phase 2	Phase 3	Phase 4
• Uterus is quiescent (inactive) • Includes entired period of pregnancy	• Uterus starts preparing for labor • Includes prelabor • Cervix ripening • Lightening	• Actual labor phase up till delivery of placenta • Includes stage 1, 2, 3	• Period after the delivery of the placenta + • Entire puerperium stage 4 + peurperium

- Cervical softening begins in phase 1   Formation of LUS   Labour

Leopold's manoeuvre

00:11:10



Leopold 1,2,3 – Done facing the face of the patient

Leopold 4 – Done facing the feet of the patient

manoeuvre	Examiner	Examiner's hands	Explains
1st maneuver K/a fundal grip	Face of patient	Fundus of uterus	• Lie of fetus • Presentation
2nd maneuver K/a lateral grip	Face of patient	Either side of maternal abdomen	• Position of fetus • Back of fetus ↙ ↘ Lt. side ↓ LOT, LOA Rt. Side ↓ ROT, ROA
3rd manoeuvre K/a 1st pelvic/ pawlik grip	Face of patient	Pelvis	Head engaged or not
4th manoeuvre or 2nd pelvic grip	Feet of patient	Pelvis	• Head engaged or not • more comfortable to patient than 1st pelvic grip

Rule of 5 / Crichton's method

00:17:30

- Tells whether the head engagement

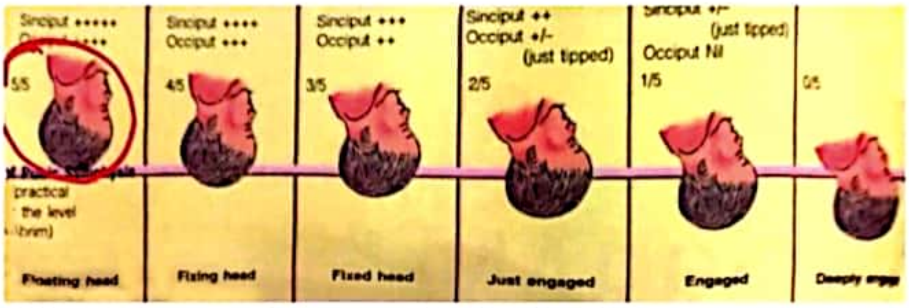
Crichton's method
↓

- Divide the head into 5 equal parts
- Numerator tells about how much fetal head is felt per abdomen

5/5	4/5	3/5	2/5	1/5	0/5
• Entire head felt P/A ↓ Free floating head			• Head just got engaged ↓ Head in pelvic cavity	Engaged	Deeply engaged

1/5 and 0/5: Head below pelvic brim

5/5 to 3/5: Head in the abdomen


Sinciput +++++
Occiput ++++
5/5
practical
the level
brim)
Floating head
Sinciput ++++
Occiput +++
4/5
Fixing head
Sinciput +++
Occiput ++
3/5
Fixed head
Sinciput ++
Occiput +/-
(just tipped)
2/5
Just engaged
Sinciput +/-
(just tipped)
Occiput Nil
1/5
Engaged
0/5
Deeply engag

Obstetrical neuropathies

00:21:16

- MC time: Intrapartum period > Post partum period
- MC nerve injury seen in labor: Lateral femoral cutaneous nerve > Femoral nerve
- MC nerve injury in lithotomy position: common peroneal nerve
- MC nerve injury due to McRobert's manoeuvres : Lateral cutaneous nerve of thigh
- MC nerve injury due to usage of forceps: Obturator > Femoral
- MC nerve injury seen in post partum period: Foot drop due to compression of lumbosacral plexus
- MC nerve injury due to C-section: Iliohypogastric and Ilioinguinal

Management of tachysystole

00:31:42

1. Stop the drug given as oxytocics
2. Change the position of patient into left lateral position
3. O_2 by mask
4. Relaxation of uterus by tocolytics. Preferred Drug: Terbutaline

Ferguson Reflex:

mechanical stretching of cervix

|

Enhances uterine activity

- manipulation of cervix and stripping of membranes leads to release of Prostaglandins
- Hence stripping of membranes leads to induction of labor
- Rupture of membranes – augmenting the labor

Induction of labor

00:36:00

- It means initiating uterine contractions in a pregnant female
- Before doing induction of labour → Be sure that cervix is ripe
- To know about cervical ripening → Bishop score
    - Components of Bishop score: mnemonic

      Delhi – Dilation of cervix – most important component
      Police – Position of Cervix – maxscore = 2
      Employed – Effacement of Cervix
      Special – station of fetal Head
      Commandos – Consistency of Cervix – max. score = 2

    - Each component given a score of 0 –3
    - If score ≥ 9 – Cervix is favourable & induction is successful
    - Score ≤ 6– Cervix is not favourable

      ↓

      First ripen the cervix
- In modified Bishop score: Instead of Effacement – length of cervix is used
- max. Bishop score can be 13

methods for cervical ripening :

Cx Ripening

mechanical methods
- Laminaria tents
- Osmotic dilators
- Sweeping / stripping of membranes

Drugs
Prastaglandins

misoprost (tab) – PGE₁
- Dose: 25 mcg-p/v
- Can be repeated every 4 hrly
- max: 6 doses

↓

- Once the contractions begin after 4 hrs

↓

start oxytocin

- For Augmentation of labor:
  - Artificial Rupture of membranes
  - Oxytocin

PGE$_2$ – Dinoprostone
cerviprime gel

↓

5 ml gel have 0.5mg of drug

↓

- Put the gel intracervically / in posterior fornix
- Repeat the gel after 6 hrs
- max applications = 3

↓

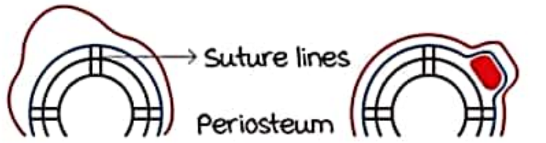
- Once the contractions begins

↓ after 6 hrs

Start oxytocin

Swelling on fetal head

00:46:52



Caput succedenum	Cephalohematoma
• Swelling above periosteum	• Collection of blood below periosteum
• Generalized swelling	• Localized collection of blood
• Occurs because head of fetus stays in one position for a long time	• Occurs due to traumatic instrumental delivery

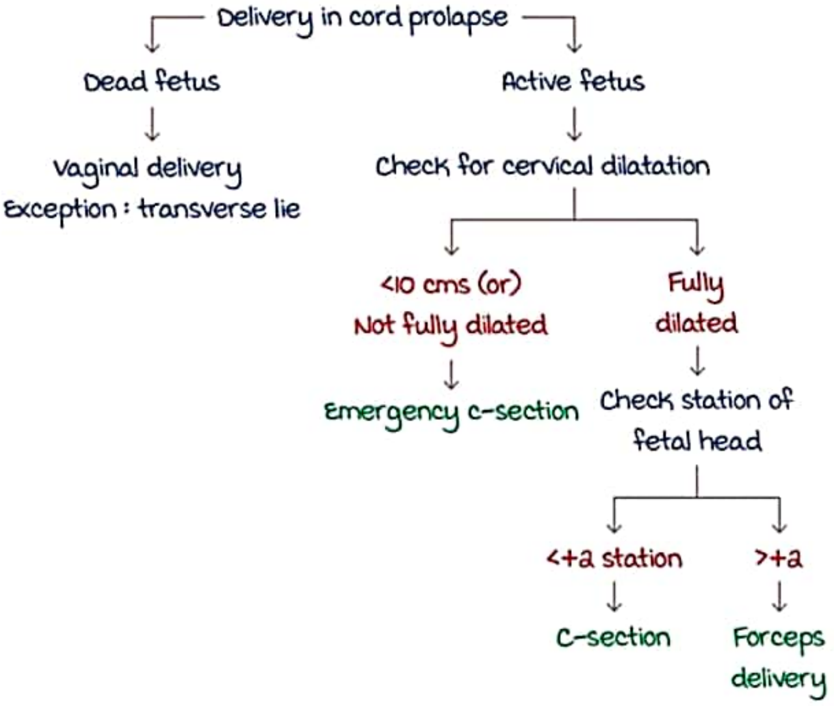
Active space

• Pitting +	• Pitting –
• Not limited by suture lines	• Limited by suture lines
• Present at the time of birth Resolves by few hours	• Not present at birth • Appears within few hrs of birth and then disappears within few days
• Not associated with fracture of underlying bone	• Associated with fracture of underlying bone
• Not associated with jaundice	• Associated with jaundice
	• Do not drain

Cord prolapse

00: 55: 33

- Obstetrical emergency
- management:
    - Immediately reposit the cord above the presenting part
    - Elevate the buttocks of female
    - Retrograde filling of bladder using foley's catheter
    - Give O_2 with mask
    - Change the position of patient to left lateral position


Delivery in cord prolapse
Dead fetus
Vaginal delivery
Exception : transverse lie
Active fetus
Check for cervical dilatation
<10 cms (or) Not fully dilated
Emergency c-section
Fully dilated
Check station of fetal head
<+2 station
C-section
>+2
Forceps delivery

Chances of cord prolapse :

Transverse lie > Footling > Knee presentation

INSTRUMENTAL DELIVERY

Forceps

Vacuum extraction

- Done only when head ≥ + 2 station
- Forceps at

+2 station → Low forceps

+3, +4, +5 station → Outlet forceps (Wrigley's forceps)

Low and outlet forceps

00:02:43

i) Pre-requisites of outlet forceps

- Scalp visible without separating mother's labia
- Fetal skull at pelvic floor
- Fetal head at perineum
- Sagittal suture of fetus → Anteroposterior direction

  Or

  maximum deflection < 45°

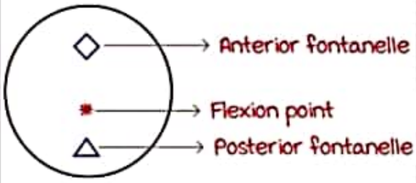
(Reason – Forceps cannot rotate the head)

ii) Direction of pull

- Low forceps : Downward → Forward → Upward & Forward
- Outlet forceps : Forward → Upward & Forward

Forceps and vacuum

00:07:26

Forceps	Vacuum
1. Criteria F- Favourable position & station O – Os should be fully dilated ↓ Cervix fully dilated R – • membranes should be Ruptured • Head should be Rotated C – uterus should be Contracting E – • Head should be Engaged • Episiotomy should be given • Bladder – Empty P – Pelvis adequate, no Cephalopelvic Disproportion (CPD)	1. Criteria All the criteria as forceps delivery except – - Vacuum is applied when cervix is ≥ 6 cm dilated - Vacuum can rotated head of the Baby
2. Traction • Primi – 20 kgs • multi – 13 kgs Application - Applied along occipitomental diameter	2. Pressure • Initial pressure – 0.2 kg/cm^2 • maximum pressure – 0.8 kg/cm^2 Chignon - Iatrogenically created Caput succedaneum Application  Anterior fontanelle Flexion point Posterior fontanelle

	• Centre of cup – applied at flexion Point ↓ • 3cm anterior to posterior fontanel • 6cm posterior to anterior fontanel • Vacuum cup – 6cm diameter • Distance between rim of the cup and anterior fontanelle – 3 cm
3. Advantages of forceps : • Preterm delivery • Fetal distress • All preesentations where vaginal delivery is possible – Vertex – After coming head of breech – Face – mentoanterior	Cannot be used in • Pre term delivery • Fetal distress • Can be used only in vertex • But not in – After coming head of breech – Face – mento anterior

Indications & complications of instrumental deliver 00:19:41

Forceps	Vaccum
Indications • maternal distress • Fetal distress • Prolonged 2nd stage of labor • Heart disease/PIH (pregnancy Induced Hypertension) ↓ Cut short 2nd stage of labour ↓ Prophylactic use of forceps	Indications • maternal distress • Not in fetal distress • Prolonged 2nd stage of Labour • Heart disease & PIH ↓ (vacuum > Forceps) Reason – Lithotomy position is not required in vacuum

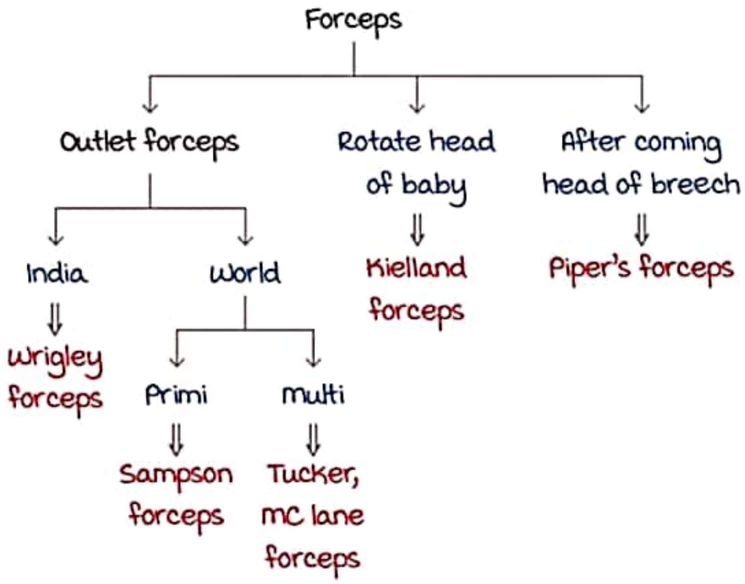
Active space

Complications • maternal injury • more common fetal complications are – Facial nerve injury – Brachial plexus injury	Complications • Fetal injury • more common fetal complications are – Cephalohematoma – 6th nerve palsy – Retinal injury
maximium attempts	
maximum 3 attempts ↓ not delivering Failed forceps ↓ management – cesarean section	maximum 3 attempts ↓ not delivering Failed vacuum ↓ management – cesarean section

Contraindications of instrumental delivery 00:25:35

1. mother – HIV +
2. Fetus – Known coagulopathy
3. Osteogenesis imperfecta
4. Contracted pelvis / Cephalopelvic Disproportion (CPD)

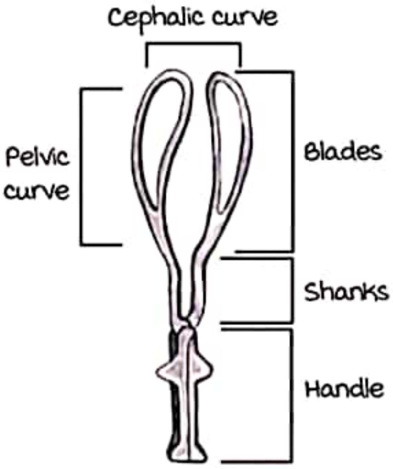
Other named forceps 00:26:48


Forceps
Outlet forceps
Rotate head of baby
After coming head of breech
India
World
Kielland forceps
Piper's forceps
Wrigley forceps
Primi
multi
Sampson forceps
Tucker, mc lane forceps

Introduction of forceps blade

- Fetal head position during labour –
  LOT (Left Occipito – Transverse) / LOA (left occipito – Anterior
  ↓
  ∴ Left blade – introduced 1st
- In case of ROT/ROA (Right occipito – transverse / Right occipito- Anterior)
  ↓
  Right blade – introduced 1st

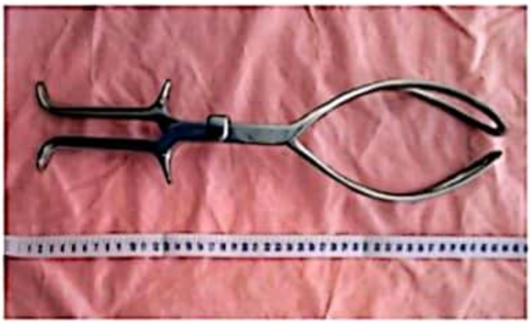
Parts of forceps



Parts

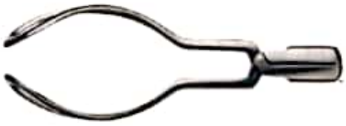
i) Cephalic curve – Accommodates fetal head
ii) Pelvic curve – Aligns with bony pelvis
iii) Shank
iv) Handle

I. Kielland forceps



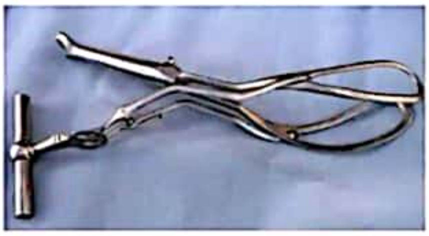
- Long forceps
- Used to delivery a head above +2 station

2. Wrigley's forceps



- Handle - small
- A short, curved forceps

3. milne murrays Forceps



Traction device

- Outdated forceps
- Has a traction device (to deliver head above +2 stations)

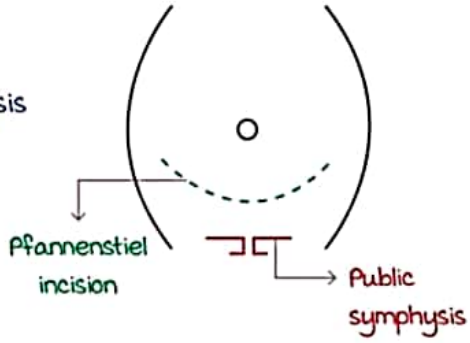
CESAREAN SECTION & VBAC

Cesarean section 00:00:05

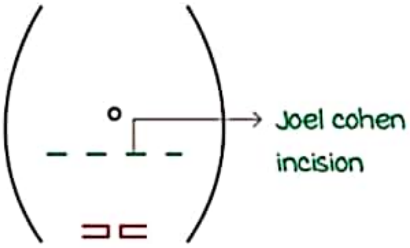
Abdominal delivery of viable fetus following an incision on skin and uterus

I. Skin Incisions in Cesarean Section

a. Pfannenstiel incision
- Curved incision
- 2 cm above public symphysis
- Low transverse incision
- Advantage: cosmetically good
- most commonly used



b. Joel Cohen incision
- Straight incision
- 3 cms above pubic symphysis



Technique

Pfannenstiel
subcutaneous tissue – cut
↓
Rectus sheath – cut
↓
Separation of Rectus sheath from Rectus abdominis
↓
Peritoneum-cut

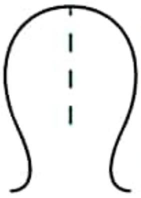
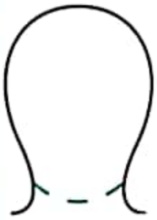
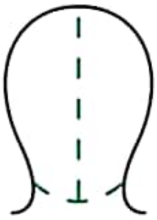
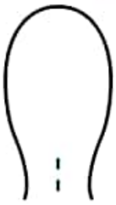
Joel cohen
Skin incision
↓
Small incision on subcutaneous tissue and separated with fingers
↓
Small incision and separation of Rectus sheath

Advantage – ↓ Blood loss
– ↓ pain [post-operatively]

∴ Better skin incision – Joel cohen > pfannenstiel

Uterine incisions in cesarean section

00:05:00

Upper uterine segment incision	Lower uterine segment incision
a. Classical cesarean section	a. Lower segment cesarean section [LSCS]
b. Chance of uterine rupture in next pregnancy - ↑[4-9%] - Reason: • Upper segment – active contraction and relaxation • Lower segment – passive dilation - Prevention of rupture • Every time a female conceives ⇓ Cesarean section	b. Chance of uterine rupture - ↓[0.2-1.5] • VBAC [vaginal birth after cesarean] - If pelvis adequate, vitals normal ⇓ VBAC can be performed for next pregnancy - VBAC / Trial of scar
c. Sanger incision  • Vertical incision • Upper uterine segment • Classical incision • Rupture: 4–9%	c. Kerr incision  • LSCS • Ruprure = 0.2 – 1.5% • Most commonly used
d. T-shaped incision  • Rupture: 4–9%	d. Kronig / De lee incision  • LSC s • Rupture = 1–7%

Indications for uterine incision

00:15:23

A. Classical Cesarean incision

Principle – If lower segment cannot be approached

- Absolute indication → Cancer cervix
- Placenta previa with vessels all over the anterior wall of LUS [lower uterine segment]
- Dense adhesions around lower segment - ⊕
- Vesico vaginal fistula repair done previously
- Preterm Cesarean section [Improperly formed LUS]
- Post mortem cesarean section

B. Kronig incision

- Constriction ring present

Misgav's ladach technique 00:19:53

- Skin incision – Joel cohen
- Type of incision – Transverse uterine incision of LUS
- After delivery of baby
  - Closure of uterus → Single layer
- Visceral & parietal peritoneum – Should not be closed
- Closure of abdomen – 2 layers → Rectus sheath + skin

VBAC 00:22:13

- LSCS due to any reason except contracted pelvis

⇓

Next pregnancy → All conditions are Normal, No cephalopelvic disproportion (CPD), Adequate pelvis

⇓

VBAC/Trial of scar

- Contraindications for VBAC

- Type of uterine incision – Classical, T-shape (inverted), Kronig
- Previous History of (H/o) uterine rupture
  - i) Previous H/o LSCS + Uterine rupture → Recurrence 6%
  - ii) Previous H/o classical c-section + uterine rupture → Recurrence 32%
- H/o any surgery where uterine cavity was opened
  - i) Hysterotomy
  - ii) myomectomy

Active space

- Previous h/o ≥ a LSCS [unless there is H/o previous vaginal delivery along with a LSCS]
- Any contraindication to vaginal delivery

- Relative contraindications for VBAC
  - Macrosomia in present pregnancy [H/o previous LSCS]
  - H/o puerperal infection
  - Breech in present pregnancy
  - Post term pregnancy

Active space

PUERPERIUM

Puerperium

00:00:17

Period after delivery upto 6 weeks postpartum

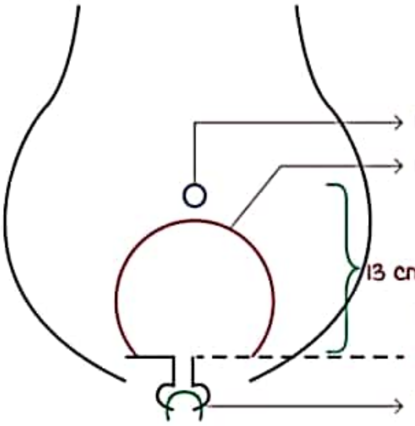
Immediate	Early	Late
With in 24hrs of delivery	24 hrs to 1 week of delivery	2nd week to 6th week

Maximum chance of infection in mother

Involution

00:03:13

1) Uterus: Position



Umbilicus

Uterus / Just below umbilicus } ≈ 20 weeks of pregnancy

Till 48 hrs: uterus remains in this position
↓
Decreases by 1.25 to 1.5 cm / day

Pubic symphysis → 10-12 day

Normal position : 4 weeks after

Size (weight) of uterus:

Immediately after delivery	1000 gms
1st week	500 gms
2nd week	300 gms
3rd week	100 gms
6th week	60 gms

Clinical significance 00:07:13

Tubectomy

↓ Within 1 week of delivery → Post-partum sterilization

↓ After 6 weeks of delivery → Internal sterilization

methods of sterilization

- Laparoscopic sterilization or minilaparotomy

Laparoscopic sterilization ↓ Cannot be done in post-partum period

minilaparotomy ↓ Can be done in Post-partum period

- mc method for female sterilization: Laparoscopic sterilization
  mc method of post-partum sterilization: minilaparotomy

Subinvolution 00:13:19

If uterus does not return to its normal position & size in the required time frame

- Causes:
  1) Infection: Endometritis
  2) Retained products of conception
  3) Fibroid uterus
  4) over distended uterus

Investigation

USG + Gentle curettage + Antibiotics

mc cause of Asherman's syndrome → Curettage done in postpartum period

Endometrium : Decidua

00:16:40

Decidua

Superficial

- Shed as lochia
- Normally till 15 days after delivery
- Can be seen -24 – 36 days after delivery
- Fishy odour
- Initially alkaline
  ↓
  Acidic

Deep

→ Helps in regeneration of Endometrium
- Begins by 7 days
- Completed by 10 days
- Restored at 16 days Except at the place where placenta was attached
  ↓
  Occurs by 6 weeks

Lochia Rubra (red)	RBC (maternal)	1-4 days
Lochia serosa (yellow)	mucus + WBC + Exudates	
Lochia alba (white)	Decidual cells	10 – 13 days

Endometritis

00:23:50

- mc site: Placental site
- mc manifestation – Puerperal pyrexia (100.4°F)
- mc Cause of puerperal pyrexia – Endometritis
- mc Organism – Group A streptococci
- mc Organism for late Onset Endometritis: Chlamydia
- In most cases – mixed infections
  ↓
  - Gram negative bacteria – Ecoli / Klebsiella
  - Anaerobic
- mc / Highest risk of Endometritis – Cesarean section
  ↓
  13 times more chances of Endometritis Compared to vaginal delivery

Active space

Other risk factors:
1) Iron deficiency anemia
2) Prolonged labor
3) PROM
4) Bacterial vaginosis

- mc route of spread – Direct spread
- Signs:
  - Uterine tenderness/fullness.
  - Tests: ↑WBC, ↑ESR, ↑CRP

Management:
Broad spectrum antibiotics
(Gentamycin + clindamycin or Ampicillin)

Changes in cervix or vagina

00:30:00

Cervix
↓
External Os
↓ Nulliparous → Pin point/ Circular
↓ Multiparous → Transverse/ slit like

- T_1 rebuild (maximum chance of HPV infection)

Vagina
↓
- Come back to its normal size and shape
- Rugosites appear in 3 weeks
- Birth trauma is a risk factor for
  ↓
  Prolapse

Breast

00:34:13

- Milk secretion
  Prolactin
- C/I Breast feeding

↓

- maximum levels – Pregnancy
- ↑ prolactin – amenorrhoea

Hypothalamus

↓ GnRH (–) prolactin

Anterior pituitary

↙ ↘

LH FSH

↓

Ovary

Pregnancy

↓

progesterone, Estrogen

↓

menstruation

} Hypothalamic pituitary ovarian-axis

Maternal

↓

① Alcohol
② IV Drug abuser
③ Breast cancer
④ Anticancer drugs
⑤ Infections
  - Active herpes on breast
  - Active Untreated TB

Baby

↓

① Lactose intolerance
② Galactosemia

- DOC for ↑ prolactin: Cabergoline
- DOC for ↑ prolactin In infertile female } Bromocriptine

- Less milk secretion

↓

Galactogogue

- metoclopramide
- Nipple stimulation
- Breast pump

- Supressing milk secretions
- DOC: Cabergoline
  - Bromocriptine
  - Inj. mixogen

↓

Not used

(risk of venous thrombosis)

- HIV in mother – Not a contraindication for breastfeeding.

Mastitis

00:44:10

- Infection of breast parenchyma.
- mc organism – Staph aureus

- mc source – Infants nose + mouth
- Symptoms: 3-4 weeks
- Unilateral
- Not a contraindication of breast feeding.

- Clinical presentation :
  - Fever
  - Breast engorgement
  - Tenderness

- Management:
  Penicillin + Dicloxacillin + milk expression

- In 10% it can lead to "Breast abscess"

↓

O/E – Fluctuant mass or fever not resolving inspite of antibiotics.

Management: Incision and Drainage (under general anesthesia)

Pelvic thrombophlebitis

00:47:57

Endometritis

↓

Lead to thrombus formation in venous circulation of mother

↓

Acts as a nidus – attracts anaerobic bacteria

↓

Thrombophlebitis

Endometritis

- mc vein involved – ovarian vein (right > left)
- mc on right side ovarian vein
- Patient presents with spikes of high fever inspite of antibiotics

+ pain in abdomen + tender mass near cornua of uterus

- IOC: MRI & CT
- Management: High dose antibiotics + Heparin

Active space

Psychological problems in postpartum

00:52:01

Postpartum blues	Postpartum psychosis	Postpartum depression
Seen in 50-60% mildest	<1% serious	10 – 20%
Gradual onset within 10 days of delivery	sudden onset 10 – 14 days	Gradual onsets 4-6 months
Withdrawal of Progesterone	adrenal axis	Changes in HPO
Reassurance + Care	Antipsychotic drugs	SSRI – Fluxietine

- Not breast feeding
  - Return of menstruation
    - ↓
    - 40% → 6 weeks
    - 80% → 12 weeks
  - Return of Ovulation
    - ↓
    - ≃ 7 weeks
    - (5 – 11 weeks)

- Contraceptive of choice in lactating females:

  1st choice: Copper IUCD

  ↓

  Time of insertion
  - Post placental
    - ↓ CuT 380 A
    - ↓ If not wait for 4-6 weeks
  - Post-partum
    - ↓ with in 48 hours of delivery

Active space

Contraception mode	Non breastfeeding	Breast feeding
LNG = IUCD	Immediately	4 weeks
Progesterone only pills (POP)	Immediately	4-6 weeks
Combined oral pills	3 weeks	6 months

- Barrier contraception – when sexual life resumes (usually after 6 weeks)

Active space

ANTEPARTUM FETAL SURVEILLANCE

Fetal monitoring

00:00:34

Antenatal period	During labor/Intrapartum
• Daily fetal movements	• Fetal heart rate (FHR) auscultation
• Non stress test	• Fetal scalp pH monitoring
• Biophysical score (BPS)	• Cardiotocography (CTG)
• modified BPS	• Fetal pulse oximetry

Characteristics of fetal heart rate

- Fetal heart rate – normal – 110 bpm – 160 bpm

↓ ↓

<110 bpm ≥ 160 bpm

↓ ↓

Bradycardia Tachycardia

↓ ↓

Indicates–1st sign of uterine rupture indicates–impending rupture

↓ ↓

management–Laparotomy management–immediate caesarean section

Fetal heart rate beat to beat variability

00:06:07

- Beat to beat variability – normally between 5 – 25 bpm
- If beat to beat variability is absent

↓

Compromised fetus
Fetal acidosis
maternal intake – of tranquilizers, phenothiazine, analgesics

- Sinusoidal heart rate pattern – FHR becomes fixed

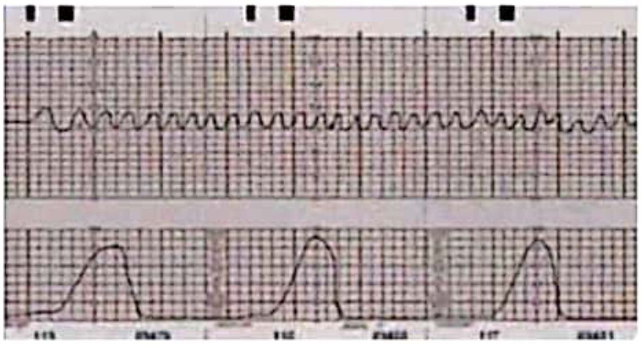
↓

It is ominous

↓

- Seen in
  - ↓ Fetal Anemia
    - ↓ Twin to twin transfusion syndrome
    - ↓ Rh incompatibility
    - ↓ Vasa previa
- management
  - ↓ Immediate termination of pregnancy

Sinusoidal pattern



Fetal heart rate - acceleration and deceleration

00:10:22

- Fetal HR acceleration – ↑ FHR on fetal movement

↓

denotes fetus is healthy

- If the fetus is ≥ 32 weeks

↓

FHR – ↑ to 15 bpm for 15 secs

- If the fetus is < 32 weeks

↓

FHR – ↑ to 10 bpm for 10 secs

- If FHR acceleration happens for ≥ 2 mins

↓

Prolonged acceleration

- NST during labor → Uterine contractions

↓

The blood flow to fetus ↓ $(P \propto 1/V)$

If it is a normal fetus → Tolerates this ↓ → FHR Normal

If compromised fetus → FHR ↓ (15 bpm for 15 secs) → Fetal HR deceleration

Types of fetal heart rate deceleration – Early deceleration

00:15:10

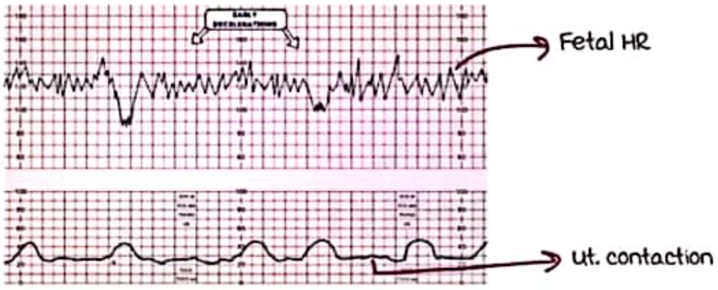
- The dip in FHR coincides with uterine contraction

↓

The dip in FHR begins when uterine contraction begins
The dip in FHR ends when uterine contraction ends

- Gradual onset, takes ≥ 30 secs
- Seen in head compression
- Physiological

Early deceleration



Types of fetal heart rate deceleration – late deceleration

00:21:05

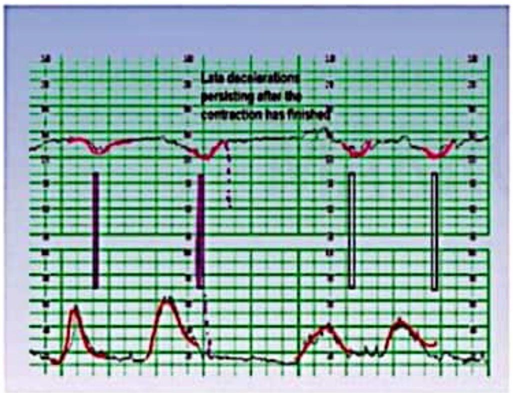
- The dip in FHR does not coincide with uterine contraction

↓

The dip in FHR begins after uterine contraction begins
The dip in FHR ends after uterine contraction ends

- Gradual dip, takes ≥ 30 secs
- Seen in uteroplacental insufficiency
  ↓
  most ominous type of deceleration

Late deceleration


Late decelerations persisting after the contraction has finished

Types of fetal heart rate deceleration – variable deceleration

00:26:15

- The dip in FHR have a variable relationship with uterine contraction
- Sudden dip in FHR – < 30 secs
- Seen in cord compression
- If the variable deceleration

↓ Happening for short time → Cord compressed for short time → Not a problem

↓ If it is persistent →
- >60 secs to recover
- Recurrent in 30 mins
- Dip in FHR during deceleration is ≥ 60 bpm

} Ominous findings

Active space

Classification of CTG tracings 00:29:46

Class – I ↓ Normal CTG ↓

- Early deceleration +/–
- Late or variable deceleration – absent

Class II

Class III ↓ Worst CTG ↓

- Absent variability of FHR
  +
  i) Bradycardia
  Or
  ii) Late deceleration
  Or
  iii) Recurrent variable deceleration
- Sinusoidal HR pattern

Fetal movement count 00:32:03

- In Antepartum period
  ↓
  Daily fetal movement count – normal
  - 10 movements in 12 hrs of non rest
  - 10 movements in 2 hrs of rest
- Perception of 1st fetal movement – Quickening
  - In primi ↓ 18 weeks
  - In multi ↓ 16 weeks
- Fetal movements maximum – at 32 weeks
- If ↓ Fetal movements ↓ – sign of fetal distress

- Whenever there is ↓ fetal movement

↓

Screening test – modified biophysical score Non stress test (NST)

↓

If abnormal

↓

Diagnostic test – BPS

Modified biophysical score

00:36:33

NST

↓

Indicates – acute insult to fetus

↓

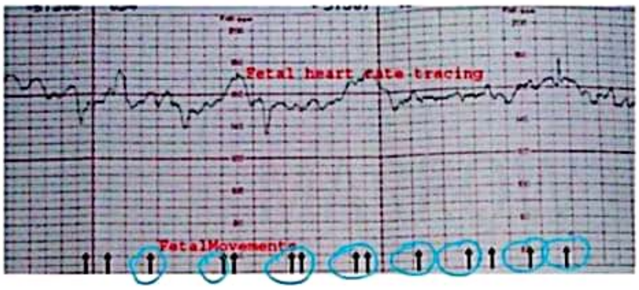
Done for 20 mins

Amniotic fluid index (NST + modified BPS)

↓

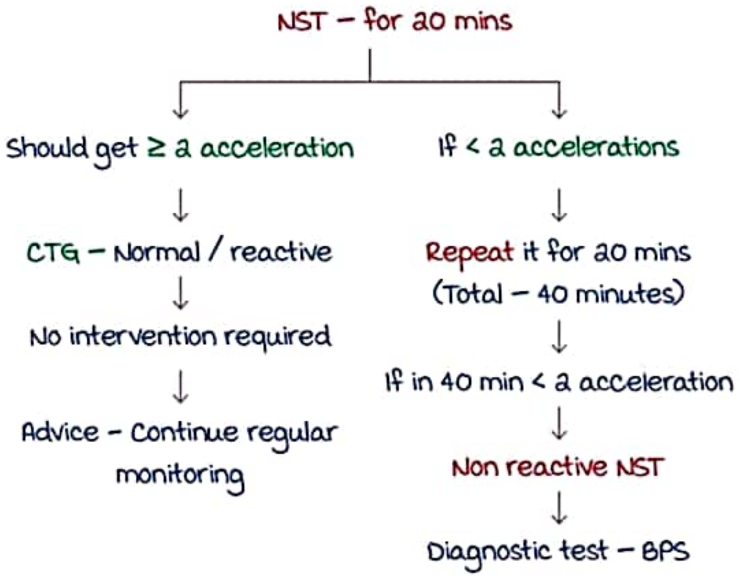
Tells about the acute & chronic insult to fetus

CTG being done



Active space

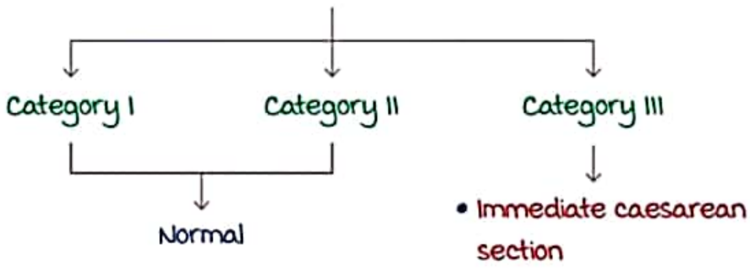
Non stress test 00:40:36


NST – for 20 mins
Should get ≥ 2 acceleration
CTG – Normal / reactive
No intervention required
Advice – Continue regular monitoring
If < 2 accelerations
Repeat it for 20 mins (Total – 40 minutes)
If in 40 min < 2 acceleration
Non reactive NST
Diagnostic test – BPS

- NST should be done regularly – weekly beginning from 32 weeks
  ↓
  In low risk pregnancy
- In high risk pregnancy (pregnancy induced hypertension, controlled diabetes)
  ↓
  NST done bi weekly
- In case of uncontrolled diabetes – NST daily

Non stress test – in labour 00:46:34

- NST at the time of labour – CTG


Category I
Category II
Category III
Normal
• Immediate caesarean section

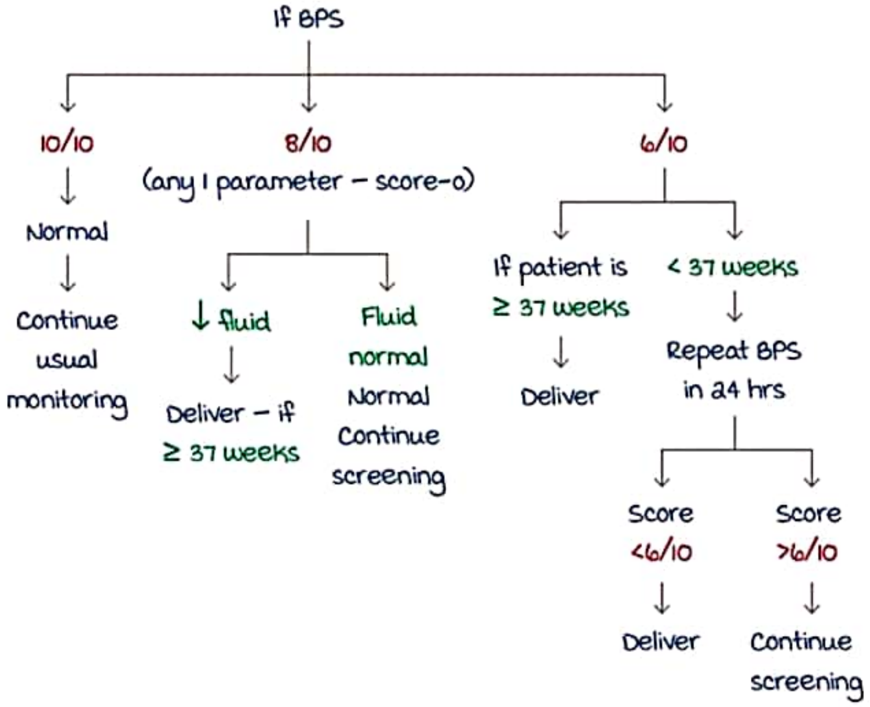
Biophysical score or manning score

00:49:01

- It is done by ultra sound for 30 mins

Mnemonic

T	Fetal Tone	1 extension + 1 flexion
B	Fetal Breathing movements	1 breathing movement × 30 sec (swallowing of amniotic fluid)
Meningitis	Gross body movements of the fetus	3 body movements
Always	Amniotic fluid pocket-(single largest vertical pocket)	2-8cms
Notorious	NST	Reactive


If BPS
10/10
Normal
Continue usual monitoring
8/10
(any 1 parameter – score-0)
↓ fluid
Deliver – if ≥ 37 weeks
Fluid normal
Normal
Continue screening
6/10
If patient is ≥ 37 weeks
Deliver
< 37 weeks
Repeat BPS in 24 hrs
Score <6/10
Deliver
Score >6/10
Continue screening

Intrapartum fetal surveillance

00:55:43

- CTG
- FHR Auscultation

	1st stage of labour	2nd stage of labour
In low risk female	30 min	15 mins
In high risk female	15 min	5 mins

Fetal scalp pH monitoring

- Normal scalp pH – 7.25 – 7.35
- If pH – 7.20 to 7.25 – Borderline

  ↓

  Repeat scalp pH after 30 min
- If pH < 7.20 – Caesarean section

Fetal pulse oximetry

- Sensor placed on fetal cheek

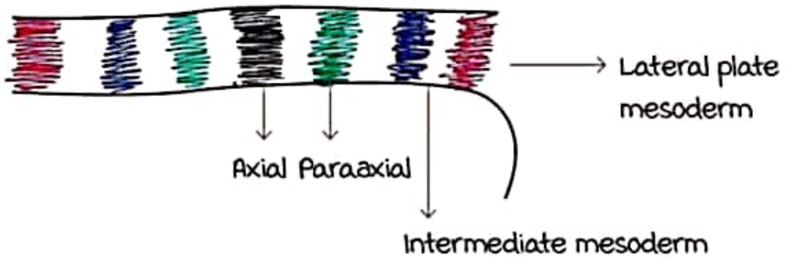
  ↓

  - Normal – SPO_2 – 40–70%
  - If $SPO_2 \leq 30\%$ – abnormal – immediate delivery

EMBRYOLOGY AND CAH – 1

Embryology

00:00:57


Lateral plate mesoderm
Axial
Paraaxial
Intermediate mesoderm

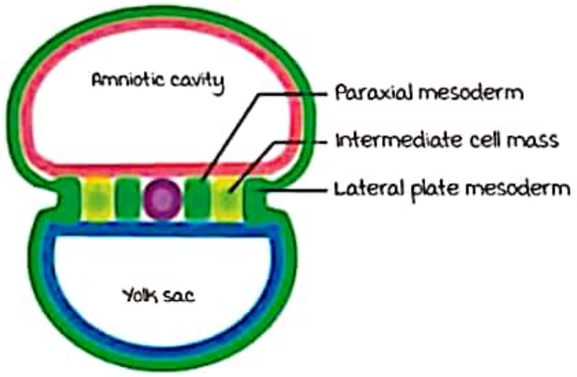
- Near notocord mesoderm is called axial mesoderm
  ↓
  On either side: Para axial mesoderm
  ↓
  Adjacent to it: Intermediate mesoderm
  ↓
  Followed by lateral plate mesoderm

- major part of genital tract: mesodermal origin
  ↓
  Except parts which arise from congenital sinus
  ↓
  Endodermal in origin

- Intermediate mesoderm
  - Urogenital / genital ridge
    - Gonads
    - Renal system
  - Ducts

- External genitalia – originate from lateral plate (dorso somatic part) mesoderm

Active space


Amniotic cavity
Paraxial mesoderm
Intermediate cell mass
Lateral plate mesoderm
Yolk sac

Gonads : development

00:05:14

- Develops from genital ridge (at 5 weeks of intra uterine life)
- mesodermal in origin
- Till 6 weeks, gonads are bipotential / indeterminant
- Sex of baby decided by

↓

SRY region / Testis determining factor

↓

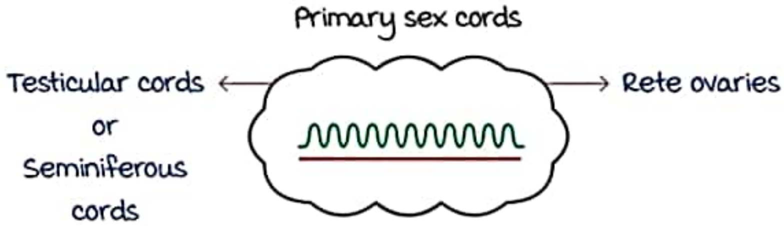
Short arm of Y chromosome

If SRY region present
↓
Y chromosome present
↓
Gonads: Testis
(medulla of gonads: testis
cortex : regress)
→ Formed by 7
weeks of IU life
→ Other genes:
Sox – 9
↓
Testis

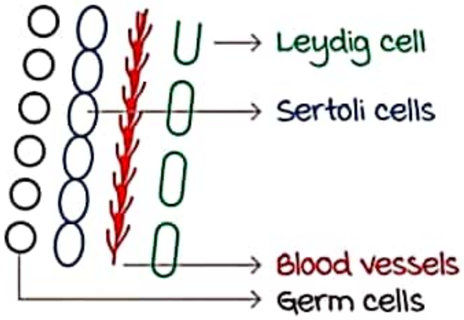
If SRY region absent
↓
Y chromosome absent
↓
Gonads: Ovary
(cortex: ovary
medulla : regress)
→ Formed by 8
weeks of IU life

WnT4
↓
Ovary

Active space


Primary sex cords
Testicular cords or Seminiferous cords
Rete ovaries

- 1st feature to distinguish between testis and ovary:
  Formation of testicular cords
- Testicles and ovaries are indistinguishable histologically up to 10-11 weeks of IU life


Leydig cell
Sertoli cells
Blood vessels
Germ cells

- Formation of ovary
  ↓
  Only in the absence of Y chromosome
  Proper development of ovary both X chromosomes are needed
- Turner's syndrome (45XO)
  ↓
  Gonads – ovary → improperly developed (streak gonads)

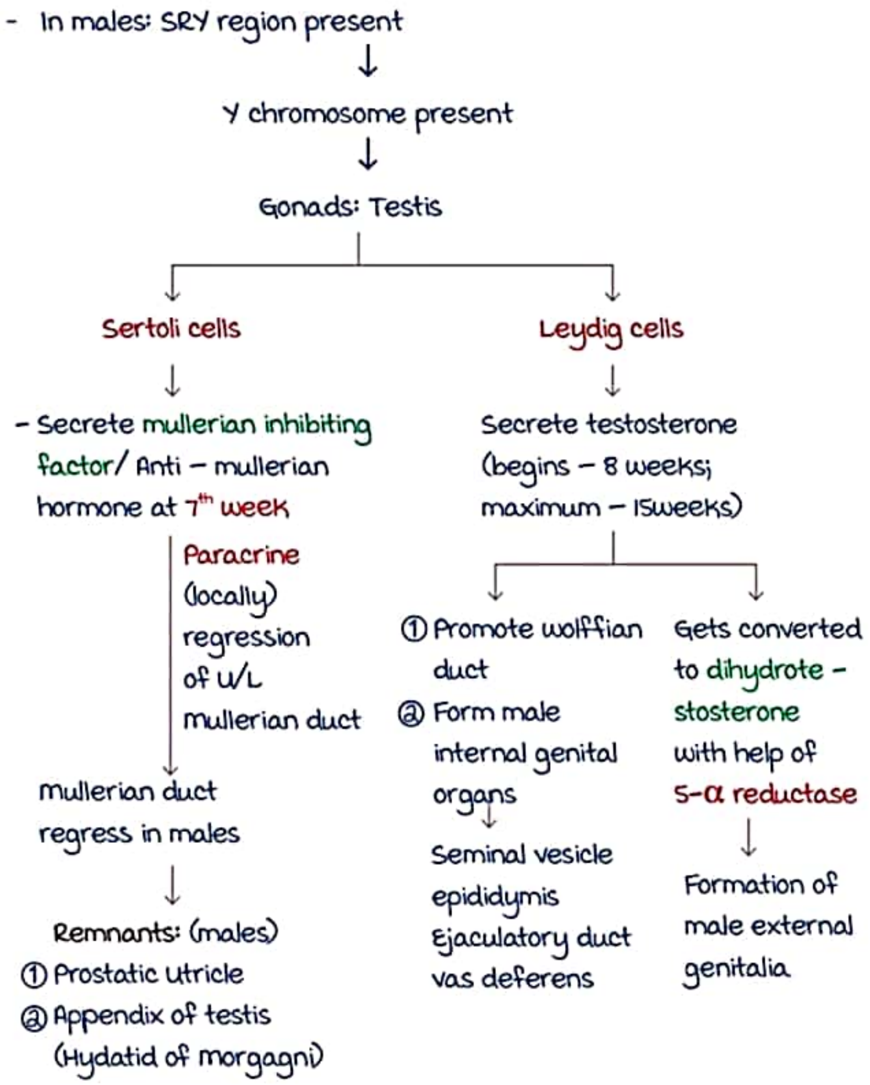
Development of ducts

00:16:39

- In early intrauterine life in both male and female – 2 pairs of ducts are present
  1) mesonephric duct: wolffian duct
  2) Para mesonephric duct: mullerian duct

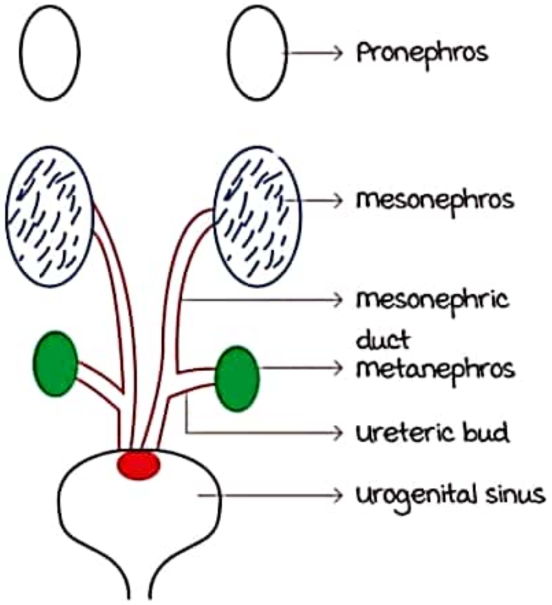
- Appears by 6 weeks

Disappear → Wolffian duct in female / → Mullerian duct in male } 9 weeks



- In males: SRY region present
  ↓
  Y chromosome present
  ↓
  Gonads: Testis
  - Sertoli cells
    ↓
    - Secrete mullerian inhibiting factor/ Anti – mullerian hormone at 7th week
    - Paracrine (locally) regression of U/L Mullerian duct
    ↓
    Mullerian duct regress in males
    ↓
    Remnants: (males)
    1. Prostatic Utricle
    2. Appendix of testis (Hydatid of morgagni)
  - Leydig cells
    ↓
    Secrete testosterone (begins – 8 weeks; maximum – 15weeks)
    - ① Promote wolffian duct
      ② Form male internal genital organs
      ↓
      Seminal vesicle
      epididymis
      Ejaculatory duct
      vas deferens
    - Gets converted to dihydrote – stosterone with help of 5-α reductase
      ↓
      Formation of male external genitalia

- Appendix of testis: Mullerian duct
- Appendix of Epididymis: Wolffian duct


Pronephros
mesonephros
mesonephric duct
metanephros
ureteric bud
urogenital sinus

- Efferent ductules in males arise from mesonephros

Anti Mullerian hormone deficiency

00:33:18

male
↓
Anti mullerian hormone deficiency
Chromosome number 46XY
↓
Gonads: Testis

Sertoli cells
↓
AMH is deficient
↓
MD grows in males
↓
Female genital organs present
→ Fallopian tubes
→ Uterus
→ Cervix
→ Upper vagina

Leydig cells
↓
Form testosterone

Wolffian duct grows
↓
male genital organs
↓
Seminal vesicle
Epididymis
Ejaculatory duct
Vas deferens

DHT
↓
male external genitelia

1) Less space : intertwining of ducts
2) Undescended testis : Cryptorchidism
3) Vas deferens obstruction
4) Infertility
5) Herniation of uterus

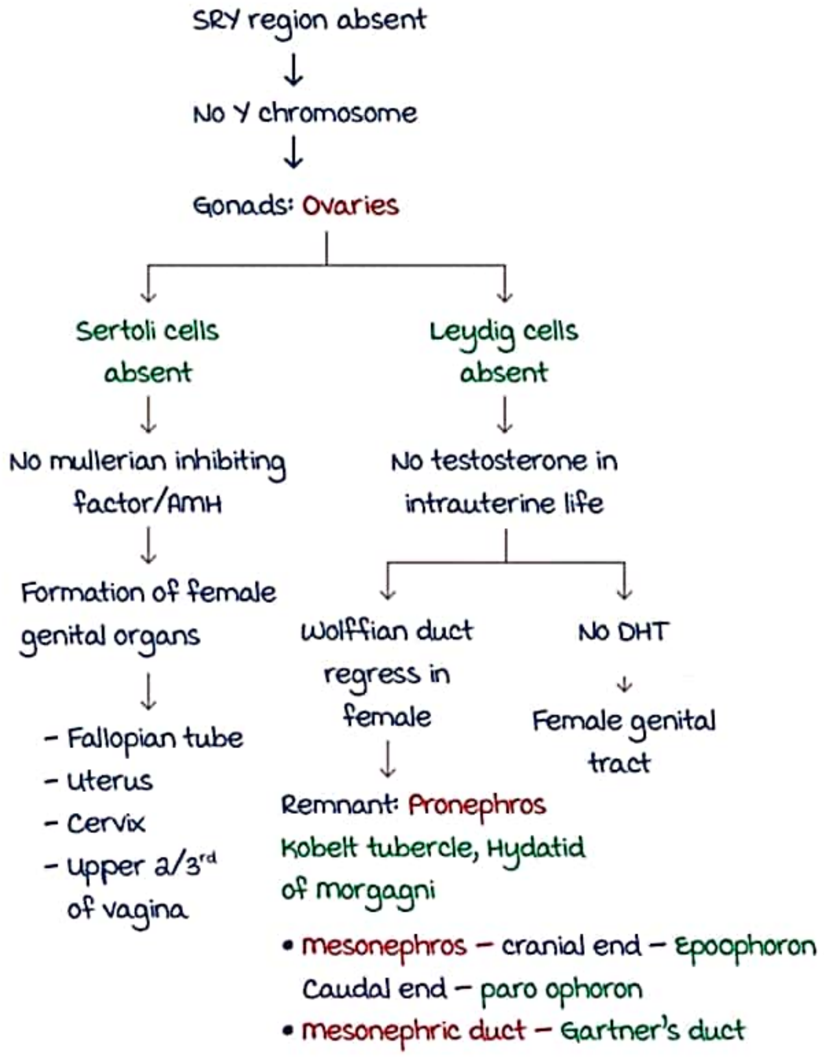
↓

Uterus hernia syndrome
(persisting mullerian duct syndrome)

- Not a cause of ambigious genitalia in males

Development of ducts in female

00:38:49



SRY region absent
↓
No Y chromosome
↓
Gonads: Ovaries

- Sertoli cells absent
  ↓
  No mullerian inhibiting factor/AMH
  ↓
  Formation of female genital organs
  ↓
  - Fallopian tube
  - Uterus
  - Cervix
  - Upper 2/3rd of vagina
- Leydig cells absent
  ↓
  No testosterone in intrauterine life
  - Wolffian duct regress in female
    ↓
    Remnant: Pronephros
    Kobelt tubercle, Hydatid of morgagni
    - Mesonephros – cranial end – Epoophoron
      Caudal end – paro ophoron
    - Mesonephric duct – Gartner's duct
  - No DHT
    ↓
    Female genital tract

- Lower 1/3rd of vagina develops from congenital sinus
  sinovaginal bulb

- Vaginal epithelium: endoderm of UGS
- Ovaries: genital ridge

Development of external genitalia 00:46:11

- Develop from dorso somatic lateral plate mesoderm
- Bipotential
- External genitalia depends on testosterone level in intrauterine life

Present → male external genitalia

Absent /resistance to testosterone → Female external genitalia

Penis ←	Genital tubercle	→ Clitoris
Scrotum ←	Genital swellings	→ Labia majora
Penile urethra ←	Genital folds	→ Labia minora

- male external genitalia formed by 14 weeks
- Female external genitalia formed by 11 weeks
- Sex of baby can be determined on USG by 14 weeks

Homologous organs 00:51:23

Organs with same embryological origin

male	Female
1) Prostate	Skene glands / Paraurethral gland
2) Cowper gland / bulbourethral	Bartholin gland
3) Littre gland	Glands in labia majora and labia minora

Ambiguous genitalia 00:53:40

Sex of the baby cannot be determined by external genitalia

male	Female
- External genitalia look like male due to presence of testosterone	- External genitalia look like female due to absence of Testosterone in Intrauterine life

Active space

Testosterone is absent or resistant ↓ External genitalia will look like female ↓ Ambiguous genitalia in males MC cause: Androgen Insensitivity syndrome (Testicular feminizing syndrome)	- If a female is exposed to testosterone ↓ Genitalia look like male external genitalia ↓ Ambiguous genitalia in female mc Cause: Congenital adrenal hyperplasia

3 structures MC affected:

1) Clitoris: Clitoromegaly
2) Labioscrotal folds: Fuse
3) Phallus (penile urethra)

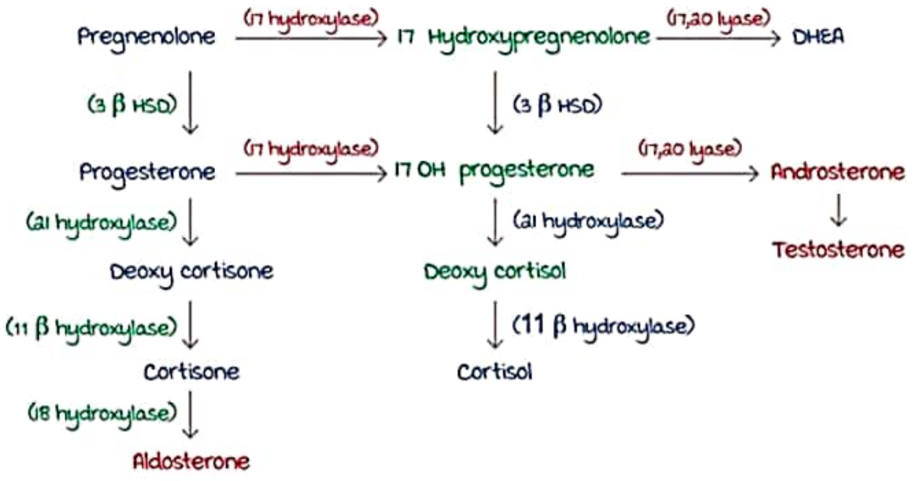
Hermaphroditism

- True hermaphroditism
  - Both ovary and testis present in same individual
  - ↓
  - Ovotestis
  - mc Karyotype: 46XX
- Pseudo hermaphroditism
  - Gonads of one sex and external genitalia of other
  - Male pseudo hermaphroditism
    - → Gonads – testis
    - → External genitalia
    - ↓
    - Female
    - MC cause : Androgen Insensitivity Syndrome
  - Female pseudo hermoaphroditism
    - → Gonads – ovary
    - → External genitalia
    - ↓
    - male
    - mc cause: CAH

EMBRYOLOGY AND CAH - 2

Congenital adrenal hyperplasia - steroid pathway 00:00:09

Steroid pathway:


Pregnenolone
(17 hydroxylase)
17 Hydroxypregnenolone
(17,20 lyase)
DHEA
(3 β HSD)
(3 β HSD)
Progesterone
(17 hydroxylase)
17 OH progesterone
(17,20 lyase)
Androsterone
Testosterone
(21 hydroxylase)
(21 hydroxylase)
Deoxy cortisone
Deoxy cortisol
(11 β hydroxylase)
(11 β hydroxylase)
Cortisone
Cortisol
(18 hydroxylase)
Aldosterone

Congenital adrenal hyperplasia 00:05:34

→ MC enzyme: 21 hydroxylase

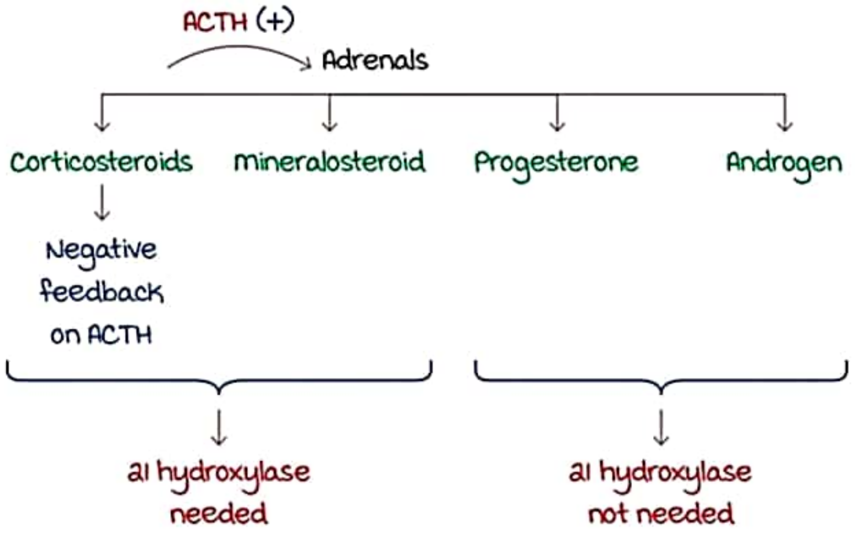
→ 2nd MC enzyme: 11 β hydroxylase

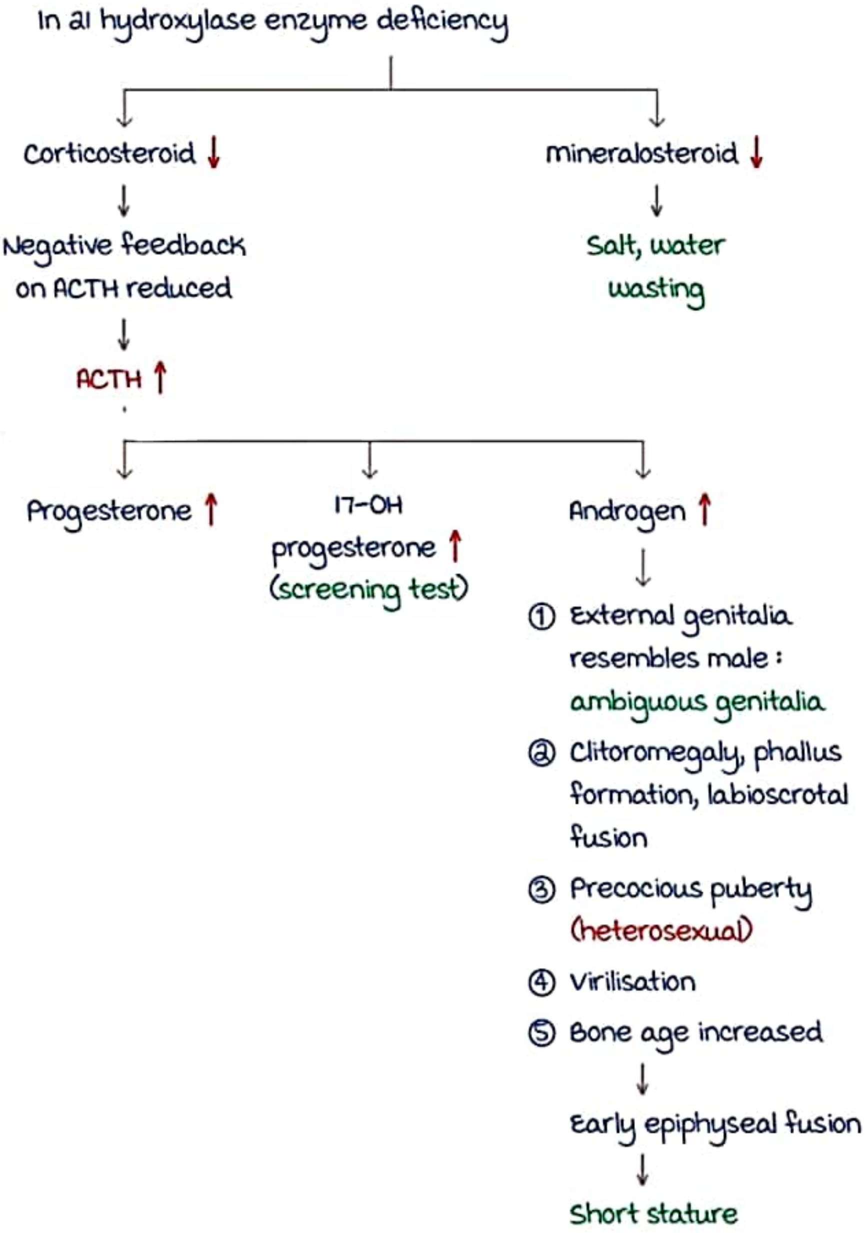
→ Least common: 3 β Hydroxysteroid dehydrogenase

→ MC gene defect: CYP $21A_2$

↓

Codes for 21 hydroxylase enzyme


ACTH (+)
Adrenals
Corticosteroids
Mineralosteroid
Progesterone
Androgen
Negative feedback on ACTH
21 hydroxylase needed
21 hydroxylase not needed


In 21 hydroxylase enzyme deficiency
Corticosteroid ↓
Negative feedback on ACTH reduced
ACTH ↑
Mineralosteroid ↓
Salt, water wasting
Progesterone ↑
17-OH progesterone ↑ (screening test)
Androgen ↑
① External genitalia resembles male : ambiguous genitalia
② Clitoromegaly, phallus formation, labioscrotal fusion
③ Precocious puberty (heterosexual)
④ Virilisation
⑤ Bone age increased
Early epiphyseal fusion
Short stature

Heterosexual precocious puberty:

In females cause:

1. Clitoromegaly
2. Deepening of voice
3. Increase muscle mass
4. Hirsutism
5. Virilisation

11 β hydroxylase deficiency

00:18:51

→ 2nd MC enzyme deficiency

→ Corticosteriod, mineralo steroid – not formed

→ Progesterone and androgens are formed

→ Female child – Ambiguous genitalia

→ Deoxy cortisol level increases

↓

mineralocorticoid like activity

↓

No salt water wasting

No hypotension

↓

Hypertension + Ambiguous genitalia

- ↑ Progesterone
- 17 OH progesterone
- ↑ Androgen
  ↓
  Ambiguous genitalia
- ↑ Deoxycortisone
  ↓
  (mineralocorticoid like action)
  ↓
  Hypertension

Screening test:

17 OH progesterone levels

- <300 ng/dl
  ↓
  Not a case of CAH
- 300-800 ng/dl
  ↓
  Do diagnostic test
- ≥ 800 ng/dl
  ↓
  Definitive (100%) diagnosis of CAH

Diagnostic test for CAH:

ACTH stimulation test:

↓ ½ hr

17 OH progesterone → ≥ 1500 ng/dl

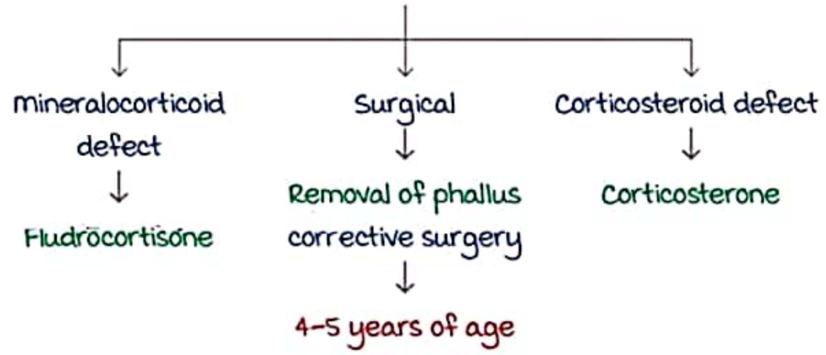
↓

CAH

Active space

Management of CAH

00:23:27

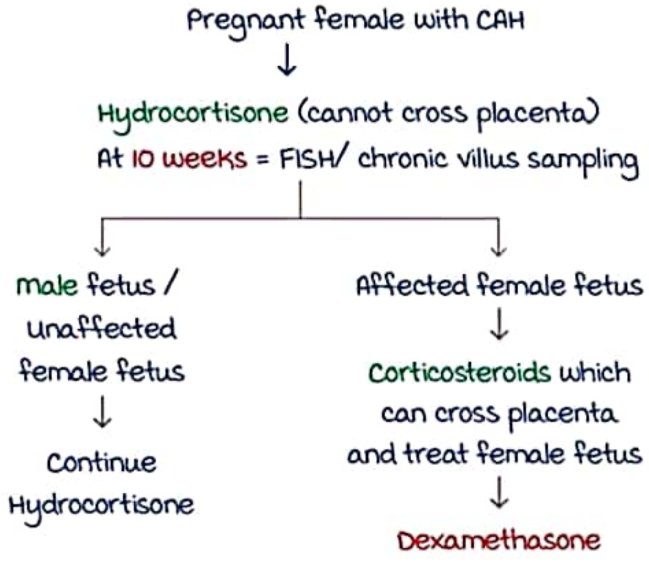


Mineralocorticoid defect → Fludrocortisone

Surgical → Removal of phallus corrective surgery → 4-5 years of age

Corticosteroid defect → Corticosterone

Age	Corticosteroid of choice
Childhood (before puberty)	Hydrocortisone (short acting)
At puberty	Prednisolone/Dexamethasone



Pregnant female with CAH → Hydrocortisone (cannot cross placenta)

At 10 weeks = FISH/ chronic villus sampling

Male fetus / Unaffected female fetus → Continue Hydrocortisone

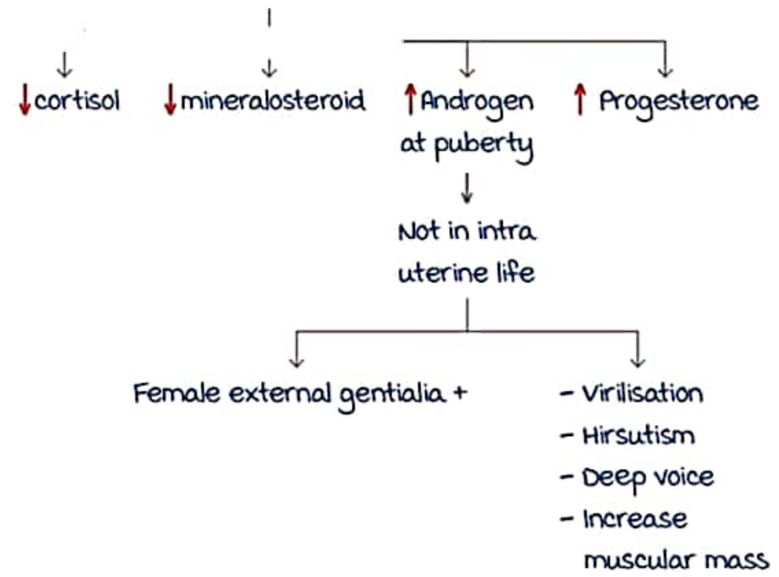
Affected female fetus → Corticosteroids which can cross placenta and treat female fetus → Dexamethasone

Active space

Late onset CAH

00:29:03

Pathogenesis of CAH begins at puberty



↓ cortisol

↓ mineralosteroid

↑ Androgen at puberty → Not in intra uterine life

↑ Progesterone

Female external gentialia +

- Virilisation
- Hirsutism
- Deep voice
- Increase muscular mass

→ Differential diagnosis: PCOS

Virilisation

→ Female with 2° sexual characters resembling male

→ Breast atrophy

→ Increase muscle mass

→ Deepening of voice

→ Increase hair growth → Hirsutism

Scoring system of virilisation :

Prader system

0 = Normal female

5 = maximum virilisation

Scoring system for hirsutism

Ferriman Gallwey score (≥ 8)

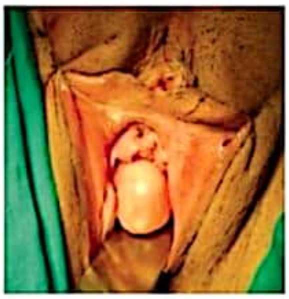
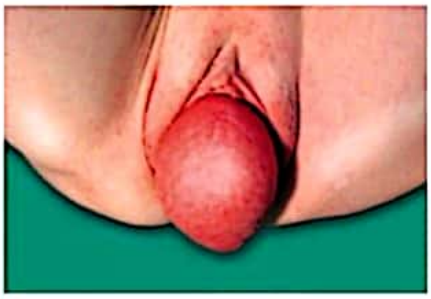
Active space

Gartners cyst vs. cystocele

00:35:00

→ Gartner's cyst:

Present in antero lateral wall of vagina

Gartner's cyst	Cystocele
	
→ Tender, shiny	→ Not shiny and tender
→ No rugosities	→ Rugosity present
→ Not reducible	→ Reducible
→ Cough impulse absent	→ Cough impulse present
→ Well defined margins	→ Not well defined margins

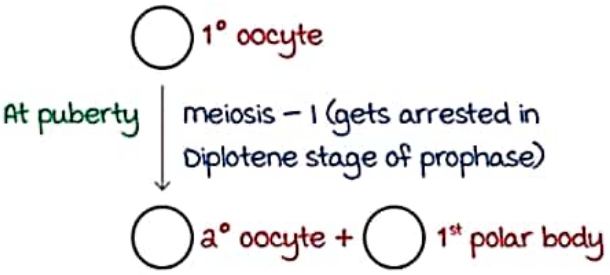
MC cyst in vagina – inclusion cyst

MC cyst in ovary – follicular cyst

MENSTRUAL CYCLE

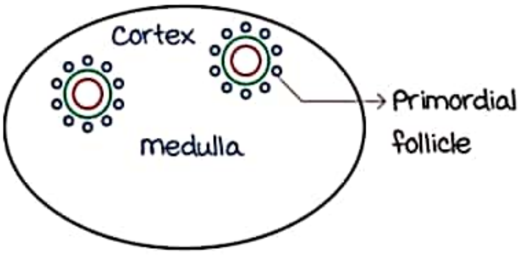
Oogenesis

00:01:33


1° oocyte
At puberty
meiosis – I (gets arrested in Diplotene stage of prophase)
2° oocyte +
1st polar body

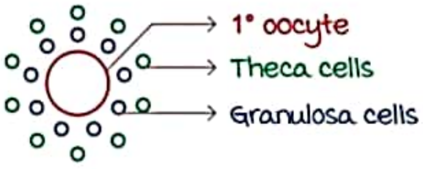
Structure of ovary

- Before puberty


Cortex
medulla
Primordial follicle

Cortex – Primordial follicle,
Granulosa cell

Medulla – Blood vessels,
Theca cells


1° oocyte
Theca cells
Granulosa cells

Primordial follicle

- Number of follicles:
  - i) Maximum = at 5th month of Intrauterine life(6-7 months)
  - ii) At birth = 1-2 million follicles
  - iii) At puberty = 4-5 lakh follicles
- Initial recruitment of follicles – hormone independent

Role of FSH

00:08:51

- At puberty, Hypothalamo – Pituitary – Ovarian – Axis (HPOA) becomes functional

Hypothalamus

Pulsatile manner ↓ Gonadotropin Releasing Hormone (GnRH)

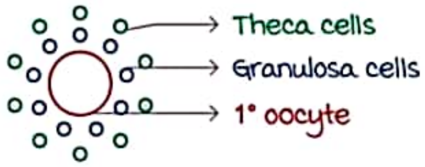
Anterior pituitary

↓

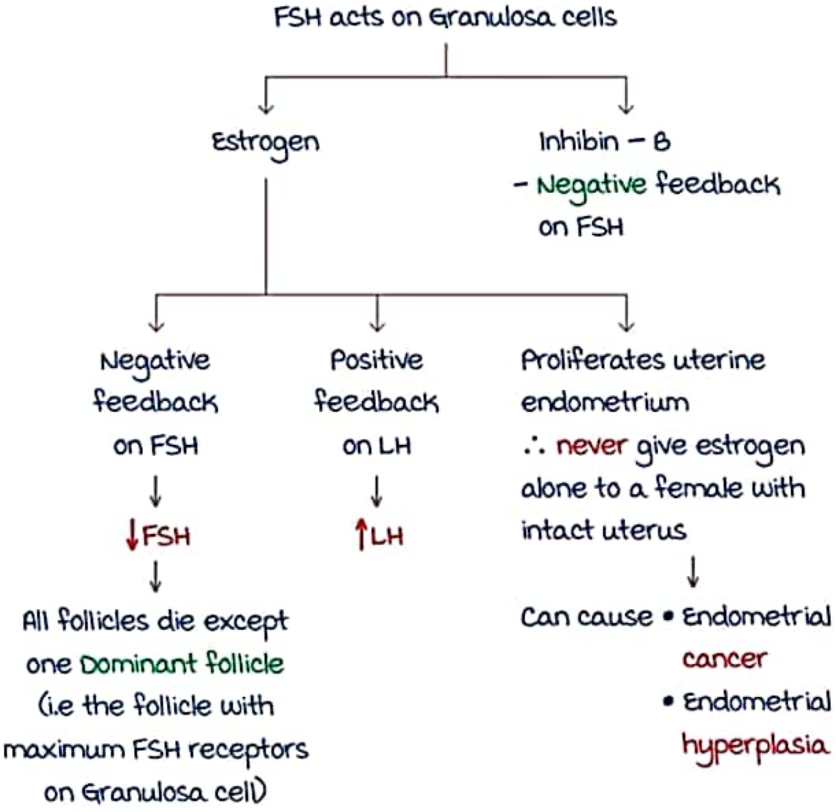
FSH (Follicle Stimulating Hormone) release

Functions of FSH :

- Prevents the follicles from undergoing atresia
- Stimulates follicles



Role of FSH :



FSH acts on Granulosa cells

↓ Estrogen

↓ Inhibin – B
– Negative feedback on FSH

Estrogen:

↓ Negative feedback on FSH
↓
↓FSH
↓
All follicles die except one Dominant follicle (i.e the follicle with maximum FSH receptors on Granulosa cell)

↓ Positive feedback on LH
↓
↑LH

↓ Proliferates uterine endometrium
∴ never give estrogen alone to a female with intact uterus
↓
Can cause
- Endometrial cancer
- Endometrial hyperplasia

Note:

1. FSH receptors are present on Granulosa cells
2. Granulosa cell tumour of ovary ⇒ Feminizing tumor
3. Tumor marker for Granulosa cell tumor of ovary ⇒ Inhibin – B

Role of LH

00:18:35

Estrogen has positive feedback on LH

↓

↑ LH

LH surge
(sudden ↑ in LH)

- Initiated by estrogen
- Estrogen = 200 pg
  x 24 hrs

↓

meiosis – 1 resumes

↓ (hormone dependent)

- Ovulation
  (1°oocyte → 2°oocyte)
- Follicle → Corpus luteum

Acts on Theca cells

↓

Produce androgens

↓

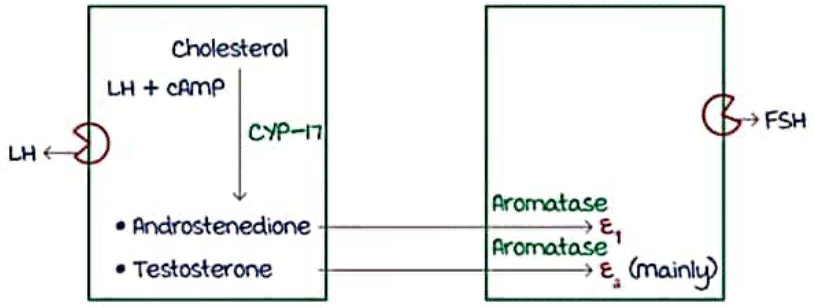
- In Granulosa cells,
  Adipose tissue.
  Androgens → Estrogen
  (By aromatase enzyme)

Acts on Granulosa cells

Two cell two gonadotropin theory

00:24:34

- Granulosa cell


Cholesterol
LH + cAMP
CYP-17
LH
• Androstenedione
• Testosterone
Aromatase
E_1
Aromatase
E_2 (mainly)
FSH

Theca cell
Aromatase enzyme absent
CYP17 present

Granulosa cell
Aromatase present
CYP17 absent

- Adipose Tissue

  Androstenedione $\xrightarrow{\text{Aromatase}}$ E_1

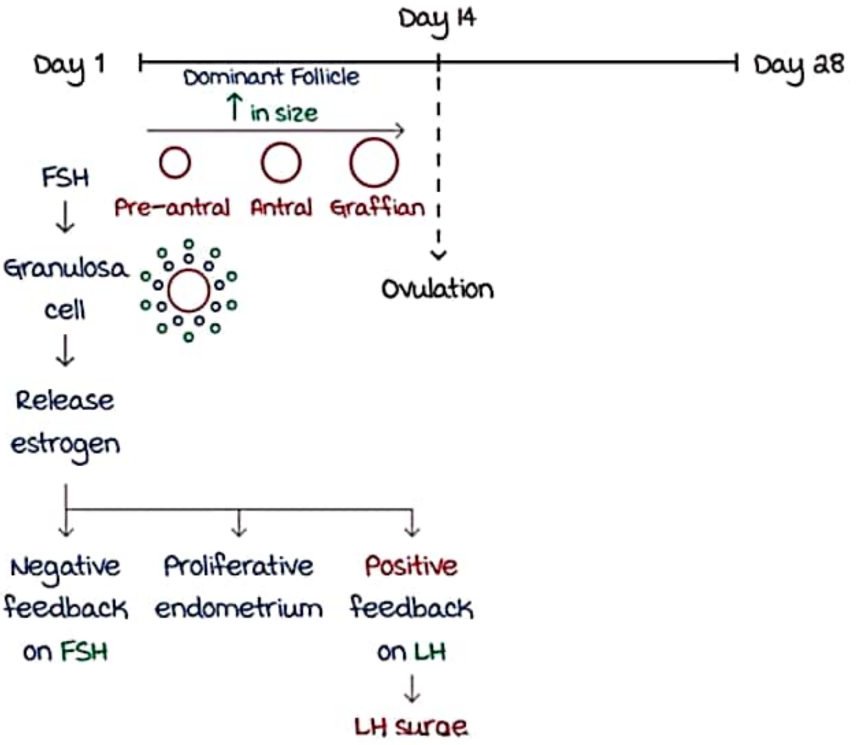
Role of LH granulosa cell 00:30:16

↑ LH
↓
Acts on Granulosa cell
↓
Luteinization of cells
↓
Small amount of progesterone release even before ovulation (at the time of LH surge)
↓
This small amount of progesterone has positive effect on LH, FSH (↑LH, ↑FSH)

Note:

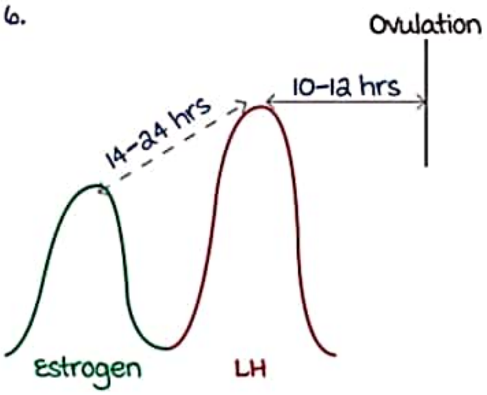
1. In females, LH receptors are present on Theca cell, Granulosa cell
2. Progesterone appears earliest in menstrual cycle at LH surge (i.e 32- 36 hrs Before ovulation)
3. There is LH & FSH surge before ovulation

Follicular / proliferative phase of menstrual cycle 00:35:37


Day 14
Day 1
Day 28
Dominant Follicle
↑ in size
FSH
Pre-antral
Antral
Graffian
Granulosa cell
Ovulation
Release estrogen
Negative feedback on FSH
Proliferative endometrium
Positive feedback on LH
LH surge

Note:

1. ovarian cycle is initiated by FSH
2. Size of follicle, just before ovulation = 18–20 mm
3. For LH surge to occur - Estrogen = 200 pg × 48hrs
4. LH surge $\xrightarrow[\text{24–36 hrs}]{\text{32–36 hrs}}$ ovulation (or)
5. LH peak $\xrightarrow{\text{10–12 hrs}}$ Ovulation
6.



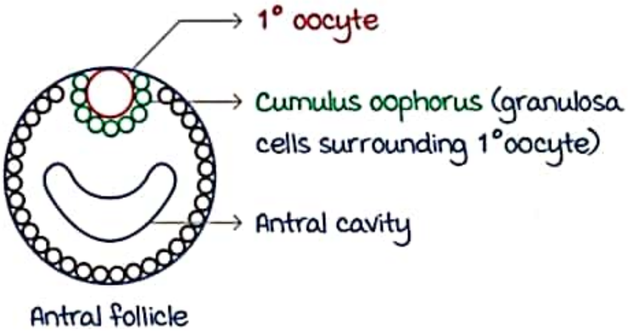
- Time interval between estrogen peak to LH peak = 14–24hrs

7. LH surge is initiated by estrogen
8. LH surge is maintained by both estrogen and progesterone
9. Before ovulation there is LH & FSH surge
10. Ovulation is due to LH surge only
11. meiosis – I is resumed due to LH surge (32–36 hrs before ovulation)

Ovulation

00:48:07

1° oocyte →


1° oocyte
Cumulus oophorus (granulosa cells surrounding 1° oocyte)
Antral cavity
Antral follicle

1. Normally

- Antral cavity fluid – Estrogen + Growth factor + LH
- LH appears in the antral cavity fluid only toward mid cycle

2. Anovulation

If LH appears in antral cavity fluid early in the cycle

↓

- Atresia of follicle
- ↓ mitotic activity of granulosa cell

↓

Anovulation

Secretory phase of menstrual cycle

00:52:50

1° oocyte → 2° oocyte

Follicle → Corpus luteum

Note

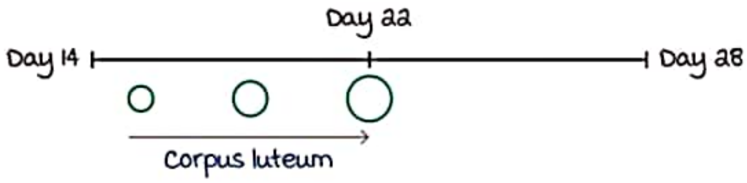
LH → maintains corpus luteum in a non – pregnant female.

- Corpus Luteum

  corpus luteum starts growing under the effect of LH

  ↓

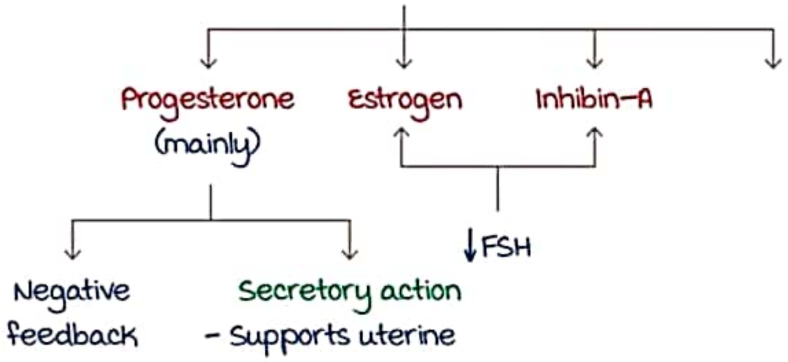
  Day 22 of cycle / 8 days after ovulation – attains maximum size & activity


Day 22
Day 14
Day 28
Corpus luteum

Hormones produced by corpus luteum

00:56:35

Hormones released by corpus luteum

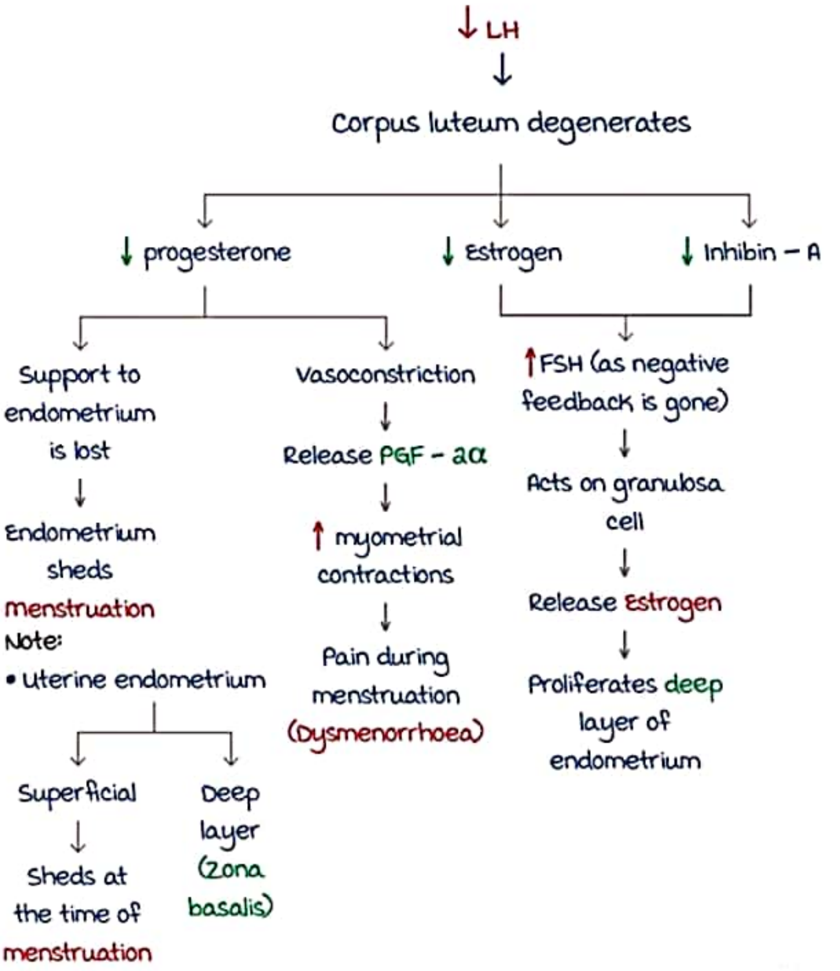

Progesterone (mainly)
Estrogen
Inhibin-A
↓FSH
Negative feedback
Secretory action
- Supports uterine

Note:

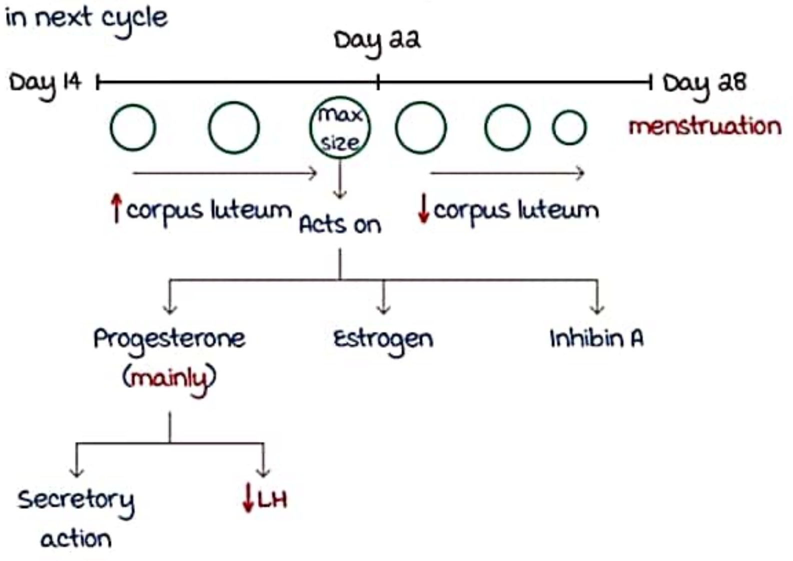
- At low concentration of progesterone → ↑ LH, ↑ FSH
- At high concentration of progesterone → ↓ LH, ↓ FSH

Corpus luteum degeneration

01:01:01


↓ LH
Corpus luteum degenerates
↓ progesterone
↓ Estrogen
↓ Inhibin – A
Support to endometrium is lost
Endometrium sheds
menstruation
Note:
• Uterine endometrium
Superficial
Sheds at the time of menstruation
Deep layer (Zona basalis)
Vasoconstriction
Release PGF - 2α
↑ myometrial contractions
Pain during menstruation
(Dysmenorrhoea)
↑ FSH (as negative feedback is gone)
Acts on granulosa cell
Release Estrogen
Proliferates deep layer of endometrium

- Deep layer is responsible for regeneration of entire endometrium in next cycle


Day 22
Day 14
Day 28
max size
menstruation
↑ corpus luteum
Acts on
↓ corpus luteum
Progesterone (mainly)
Estrogen
Inhibin A
Secretory action
↓ LH

- 2nd half of menstrual cycle – luteal / secretory phase

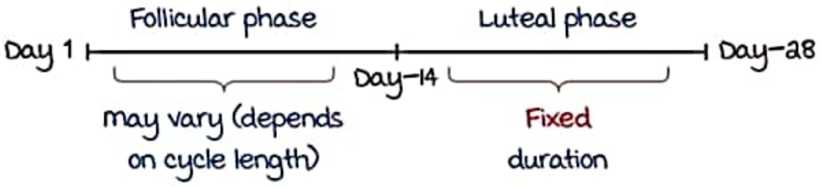
Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

One liners in menstrual cycle

01:13:20

1. Main hormone in
    - 1st half of cycle → Estrogen
    - 2nd half of cycle → Progesterone

2.



- Day of ovulation – Count 14 days backwards from the date of next menstruation

Or

Ovulation = Total length of cycle – 14
(eg : 26 day cycle, day of ovulation = 26 – 14 → Day 12)

3. Corpus luteum
    a. LH → maintains corpus luteum in non – pregnant female
    b. HCG → maintains corpus luteum in pregnant female
    c. Life span of corpus luteum in non – pregnant female → 10-12 days
    d. Life span of corpus luteum in pregnant female → 10-12 weeks
    e. hCG → Protects corpus luteum from undergoing luteolysis

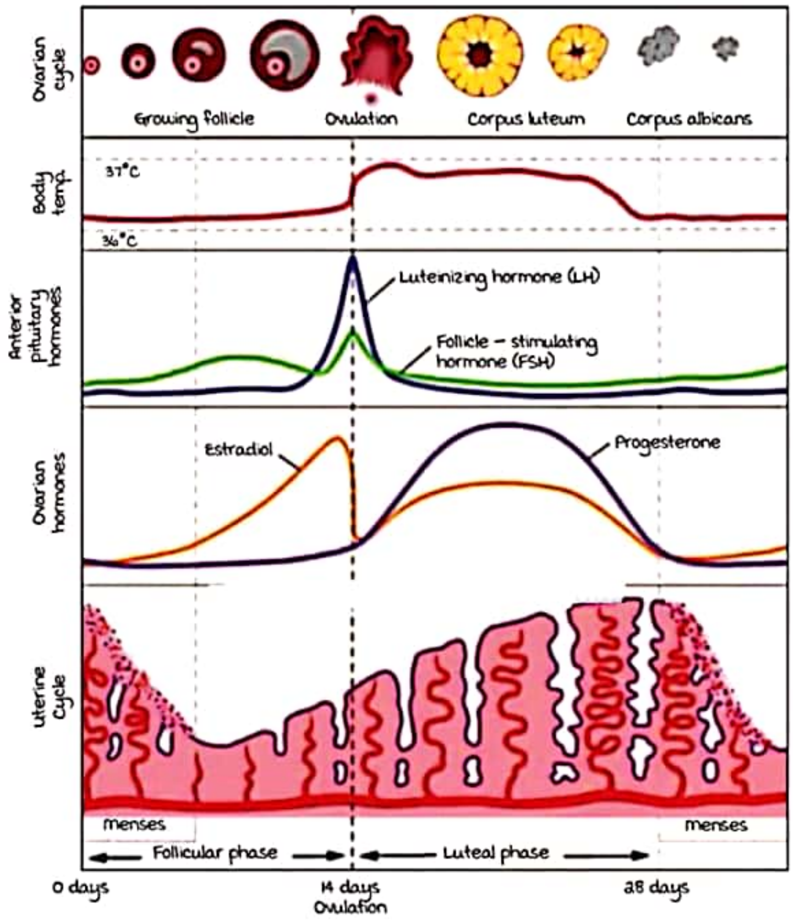
Levels of hormones

01:23:11

1. All hormones peak at time of ovulation (LH, FSH)
2. Estrogen → Peaks just before ovulation (24 – 36hrs)
3. Progesterone → Peaks at day 22 of cycle (8 days after ovulation)
4. At Day 22
    - Progesterone peaks
    - Size of corpus luteum – Maximum
    - All tests for ovulation – done at day 22 of cycle
5. At high concentration of progesterone → Negative feedback on LH, FSH

∴ Level of LH, FSH → Minimum in secretory phase
or
Day 22 of cycle
Or
1 week before menstruation

- Mittelschmerz Syndrome
  midcycle pain abdomen
  Or
  Pain in the abdomen at the time of ovulation


Ovarian cycle
Growing follicle
Ovulation
Corpus luteum
Corpus albicans
Body temp.
37°C
36°C
Anterior pituitary hormones
Luteinizing hormone (LH)
Follicle – stimulating hormone (FSH)
Ovarian hormones
Estradiol
Progesterone
Uterine cycle
menses
menses
Follicular phase
Luteal phase
0 days
14 days
Ovulation
28 days

MENSTRUAL CYCLE : NORMAL AND ABNORMAL

Menstrual cycle introduction

00:00:31

- Definition:
  Shedding of superficial layer of endometrium

- Initially: High levels of progesterone supporting endometrium

  Eventually: Progesterone level decrease support of endometrium – lost

  ↓

  menstruation

- most important hormone needed for menstruation

  ↓

  Progesterone

- Progesterone cannot act unless endometrium is primed with Estrogen

- In case of postponing /preponing the menses

  ↓

  2-3 days before expected date of menstruation

  ↓

  Start progesterone (Eg: 5mg Primolut-N TDS)

  ↓

  High progesterone levels

  ↓

  Once stopped, levels of progesterone will go down

  ↓

  menstruation starts after 2-3 days

- Female complains of delayed menstruation (10 days)

↓

Sexually active female

↓

Urine pregnancy test (UPT)

Positive

↓

Pregnancy
mc cause of secondary amenorrhea

↓

↑ Progesterone levels

↓

Support decidua (pregnant endometrium)

↓

No menstruation
→ After delivery: Placenta removed

↓

↓ Progesterone levels

↓

Shedding of decidua

↓

"Lochia"

Negative

↓

→ Reduce Progesterone levels

↓

Shedding of endometrium

↓

menstruation
→ Drug: meprate 10mg (BD/TDS)

↓

5-7 days

↓

Increase Progesterone levels

↓

Once stopped, progesterone levels fall down

↓

Loss of endometrial support

↓

menstruation Starts.

- Female with complains of anovulation

No Corpus Luteum

↓

Reduced / Absent progesterone

↓

"Amenorrhoea"

Hormone present: Estrogen

↓

Proliferates endometrium

↓

Shedding of weak endometrium
"Estrogen break through bleeding"

Active space

- Estrogen break through bleeding
  ↓
  Can occur in anyone
  ↓
  "Anovulatory Cycles"
  ↓
  Irregular, Painless, heavy bleeding

Normal menstrual cycle 00:15:53

Sudden decrease in progesterone levels

↓

Release of metallo-proteinase enzyme
↓
Ischemic necrosis of endometrium
↓
Endometrial Shedding

↓

Vasoconstriction
↓
PGF 2α released
↓
↑ myometrial Contraction
↓
Dysmenorrhoea (Pain during menstruation)
↓
Indication of ovulation (Indirect)

Dysmenorrhea 00:19:08

- Pain at the time of menstruation

Primary Dysmenorrhea	Secondary Dysmenorrhea
1) Pain due to PGF 2α ↓ No Pelvic pathology	1) Pain due to pelvic Pathology Example: → Endometriosis (mc) → Adenomyosis → Fibroids → Polyps
2) Spasmodic dysmenorrhea	2) Congestive dysmenorrhea

Primary Dysmenorrhea	Secondary Dysmenorrhea
3) Seen in: Younger age group Complains of dysmenorrhea ↓ → Since beginning of menarche, except for initial few months	3) Seen in: Reproductive age group Complains of dysmenorrhea ↓ Present since few months (initially – absent)
4) Pain begins 1-2 days before menstruation ↓ Subsides: onset of menstruation (within 12 hrs) → Never present after 48 hrs	4) Pain is present 3-5 days before menstruation ↓ Does not subside with onset of menstruation

Management of dysmenorrhea

00:26:10

Primary Dysmenorrhea
↓
① NSAIDs: mefenamic acid
② Oral Contraceptive pills (OCP's)
↓
Anovulatory cycles

Secondary Dysmenorrhea
↓
Treatment of underlying disease pathology

Oral Contraceptive pills (OCP's)

Synthetic Estrogen + Synthetic Progesterone

Synthetic Estrogen
↓
Reduce natural FSH and Estrogen

Synthetic Progesterone
↓
Reduce Natural LH and Progesterone

↓
Anovulation

Advantage:

1) Used for Contraception
2) management of dysmenorrhea
3) Used as DOC in irregular menstrual cycles
4) Protective for ovarian cancer

In OCP's:

If Estrogen → 30-35 mcg (Low dose pill)
If Estrogen → < 20 mcg (Very low dose pill)

5) Protective in:

- Endometrial Cancer
- Endometrial hyperplasia
- Fibroids
- Endometriosis

Hyper estrogenic conditions

6) management of excessive bleeding.
↓

Drugs used:

1) Tranexamic acid
2) OCPs
3) Progesterone

Characteristics of normal menstrual cycle

00:39:07

1) Normal length	Study based : 24-38 days Population based : 21-35 days
2) Average length	28 days (15% of females)
3) Number of days of bleeding	2-7 days
4) Average days of bleeding	4-6 days
5) Normal blood loss	5-80 ml
6) Average blood loss	1st best answer – 30ml 2nd best answer – 35ml 3rd best answer – 50 ml

Atypical uterine bleeding

00:40:48

Definition: "Any deviation from normal characteristics of menstrual cycle"

Types:

1) menorrhagia

- Excessive bleeding at regular cycles
  ↓
  - Blood loss > 85ml
    Or
    Number of days of bleeding > 7 days
- Seen in Fibroid

2) Hypomenorrhea

- Reduced bleeding at regular cycles
  ↓
  - Blood loss < 5ml
    Or
    Number of days of bleeding < 2 days
- seen in "Asherman Syndrome"

3) Oligomenorrhea

- Longer duration of cycles
  Or
  Number of cycles in a year is less
  Or
  Infrequent menstruation

4) Polymenorrhea

- Short Cycles / Frequent menstruation

5) metrorrhagia

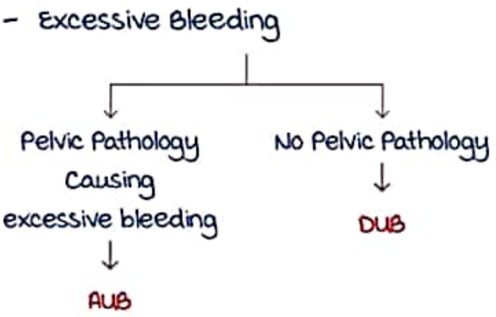
- Intermenstrual bleeding / Irregular bleeding
- Seen in Polyps

6) menometrorrhagia

- Excessive bleeding at irregular intervals (menorrhagia + metrorrhagia)
- Seen in Fibroid Polyp, Anovulatory Cycles

Active space

Abnormal uterine bleeding (AUB) and dysfunctional uterine bleeding (DUB) 00:48:45


- Excessive Bleeding
Pelvic Pathology Causing excessive bleeding
AUB
No Pelvic Pathology
DUB

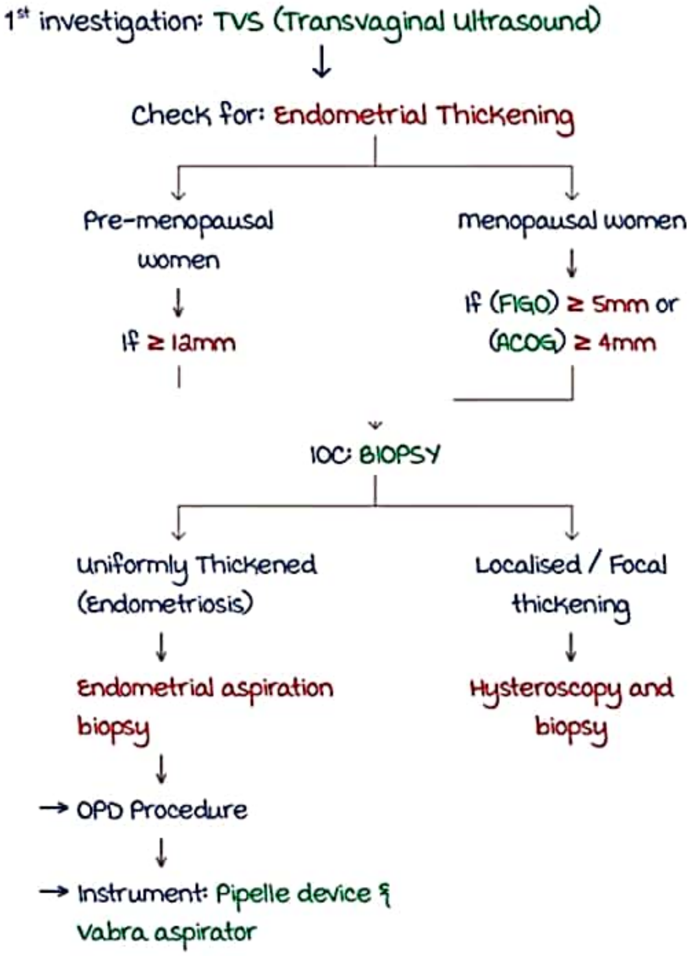
Causes of abnormal uterine bleeding

Mnemonic: PALMCOEIN

P → Polyps
A → Adenomyosis
L → Leiomyoma (fibroid)
M → Malignancy
C → Coagulation disorder

O → Ovulatory dysfunction
E → Endometrial dysfunction
I → Iatrogenic
N → Not yet Classified

Management of excessive bleeding 00:51:25


1st investigation: TVS (Transvaginal ultrasound)
Check for: Endometrial Thickening
Pre-menopausal women
If ≥ 12mm
Menopausal women
If (FIGO) ≥ 5mm or (ACOG) ≥ 4mm
IOC: BIOPSY
Uniformly Thickened (Endometriosis)
Endometrial aspiration biopsy
→ OPD Procedure
→ Instrument: Pipelle device & Vabra aspirator
Localised / Focal thickening
Hysteroscopy and biopsy

Investigations

- Gold Standard: Fractional curettage
- 2nd best: Dilation and curettage

Dysfunctional Uterine Bleeding (DUB) 01:01:53

- 80% are anovulatory

Young age ↓

Puberty menorrhagia

- Investigations:
  - ① TSH levels
  - ② Coagulation profile
  - ③ TVS

Never do:

- ① Per vaginal examination
- ② Dilation and curettage

Reproductive age:

- Investigations:
  - ① TSH levels
  - ② Coagulation profile
  - ③ TVS

Complications:

- → Pregnancy related
- → Premalignant lessions

menstruating age ↓

Rule out cancers

Management of DUB 01:05:38

- mild – moderate bleeding

1st line management

- ① Non hormonal
  - Tranexamic acid
  - mefenamic acid

  ↓

  For Dysmenorrhea
- ② OCP's

  ↓

  For irregular cycles

Best

- ① Oral Contraceptive pills (OCP's)
- ② Progesterone (5mg BD x 21 days) (In reproductive age)
- ③ Mirena – Progesterone IUCD

- Severe bleeding
  ↓
  Check for vitals
  - Vitals Stable
    ↓
    High dose of oral Estrogen x 24 hrs
    ↓
    OCPs or Progesterone
  - Vitals unstable
    ↓
    Dilation and curettage
    ↓
    Put patient on IV estrogen / OCP / Progesterore (Not available in india)

- Bleeding not controlled by medical management
  ↓
  Age ≥ 40 years
  - Total Abdominal Hysterectomy (TAH) (uterus + Cervix)
  - Transcervical resection of endometrium or endometrial ablation (TCRE)
    ↓
    Contraindicated in young females

HORMONES IN GYNAECOLOGY - 1

Natural GnRH 00:00:17

- Released by Arcuate Nucleus of Hypothalamus
- Released in pulsatile manner
- Decapeptide
- T½ = 3-4 minutes
- Neurons which synthesise the GnRH

↓

Present in olfactory placode

↓

Via olfactory nerve

↓

Arcuate Nucleus

} Neuronal migration is absent

↓

Kallmann syndrome

Kallmann syndrome

- X-linked recessive disease
- Mutation : Kal-1-gene
- M : F = 6 :1
- Hypothalamic failure + Anosmia ± colour Blindness in male

↓

GnRH ↓

↓

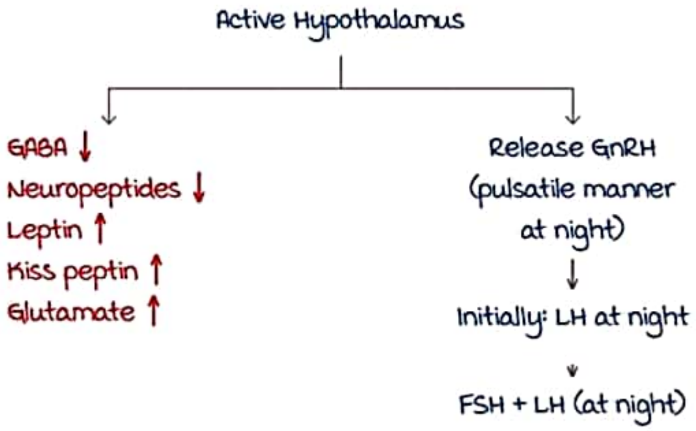
LH ↓ and FSH ↓

↓

Estrogen ↓

- Patient complains of : Delayed puberty
  1° Amenorrhea
  Infertility
- Example of Hypogonadotropic Hypogonadism
- Height of the patient is normal

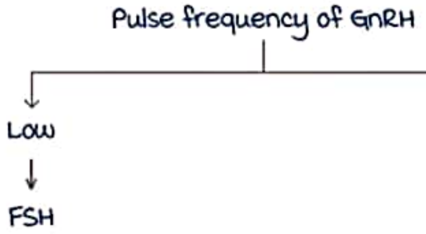
- At time of puberty:



Active Hypothalamus

GABA ↓
Neuropeptides ↓
Leptin ↑
Kiss peptin ↑
Glutamate ↑

Release GnRH
(pulsatile manner
at night)
↓
Initially: LH at night
↓
FSH + LH (at night)



Pulse frequency of GnRH

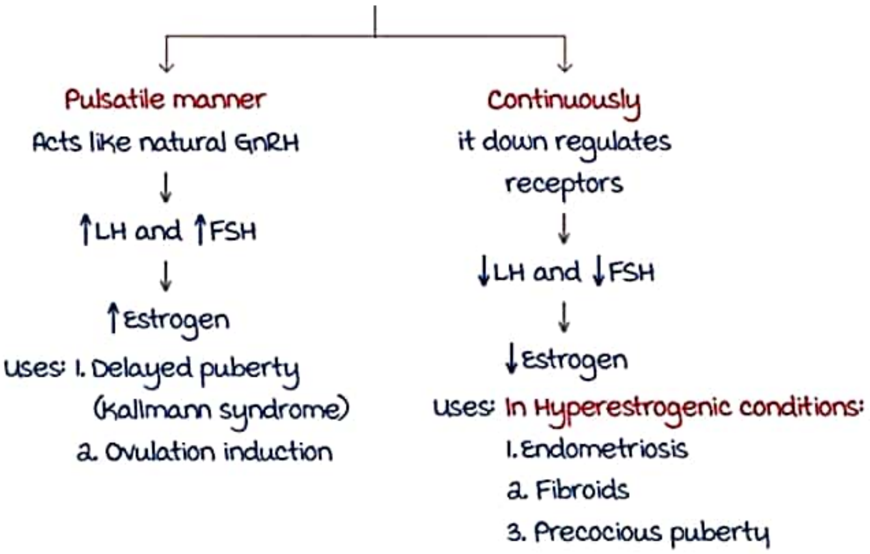
Low
↓
FSH

High
↓
LH

Synthetic GnRH

00:11:29

- Leuprolide
  Triptorelin
  Goserelin
  Nafarelin
- High first pass metabolism
  - Orally inactive
  - Given: S.C, I.V, I.m, Nasal sprays
- Can be given by



Pulsatile manner
Acts like natural GnRH
↓
↑LH and ↑FSH
↓
↑Estrogen
Uses: 1. Delayed puberty
(Kallmann syndrome)
2. Ovulation induction

Continuously
it down regulates
receptors
↓
↓LH and ↓FSH
↓
↓Estrogen
Uses: In Hyperestrogenic conditions:
1. Endometriosis
2. Fibroids
3. Precocious puberty

→ As it ↓ estrogen if used
≥ 6 months
↓
Experience menopause like symptoms (m.c → Hot flushes)

∴ Add Back therapy
(Estrogen +
Progesterone administration)

Natural and synthetic LH and FSH

00:18:28

Natural LH and FSH :

LH	FSH
→ Released by: Anterior pituitary	→ Anterior pituitary
→ Receptors present on: ♀: Theca + granulosa cells	→ Granulosa cells
♂: Leydig cells	→ Sertoli cells
→ T ½: 20 min	→ 3-4 min

- Hormones and Receptors:

Hormones:	Receptors:
→ GnRH LH FSH hCG	→ G-protein coupled membrane receptors
→ Estrogen Progesterone Androgen	→ Nuclear Receptors present in cytoplasm

Synthetic LH and FSH:

- Obtained from urine of post-menopausal ♀

Known as human menopausal Gonadotropin (HMG)

- Has 75 IU of LH and 75 IU of FSH
- Uses: Ovulation induction
  1. Multi fetal pregnancy = 30%
  2. Ovarian Hyper Stimulation Syndrome (OHSS) = < 5%

Estrogen and progesterone

00:23:23

Estrogen

→ Natural Estrogen → C_{18}

→ Forms of naturals:
- E_1: Estrone
- E_2: Estradiol
- E_3: Estriol
- E_4: Estetriol

→ m.c Estrogen
- Reproductive Age → E_2
- menopause → E_1
- Pregnancy → E_3

→ most specific in pregnancy: E_3

→ Ratio $E_2:E_1 = 2:1$ in PCOS, this ratio is reversed

→ Potency wise: $E_2 > E_1 > E_3 > E_4$

- Sources:
  1. Granulosa cells
  2. Theca cells
  3. Corpus luteum
  4. Placenta (uses fetal DHEA)

- Binds to:

→ Sex Hormone Binding Globulin (SHBG) mainly

→ Albumin Free Estrogen: 1%

Progesterone

→ Natural progesterone → C_{19}

→ Synthetic progesterone → C_{21}

↓

Androgens are also C_{21}

→ Synthetic progesterones have Androgenic side effects

1st generation
2nd generation
3rd generation
4th generation } As generation ↑, Androgenic side effects ↓

→ Least Androgenic side effects seen with 3rd generation progesterone
- Desogestrel
- Norgestimate
- Gestodene

→ 4th generation progesterones are Anti-androgenic

Eg: Drospirinone cyproterone acetate

- Sources:
  1. Granulosa cells
  2. Corpus luteum
  3. Placenta

1. Do not bind to SHBG
2. Binds to:

→ Albumin

→ Cortisol Binding protein

Free progesterone: 2%

Active space

SHBG

↑ By
Estrogen

↓ By
Mnemonic: All india
PG counselling
All → Androgen
India → Insulin
P → Progestin
G → GH
Counselling → Cortisol

- End product:
  - → Glucoronide (mainly)
  - → Sulphonide

- End product:
  - → Pregnanediol
  - → 17 Hydroxy progesterone
    ↓
    Pregnanetriol

Effects of estrogen and progesterone

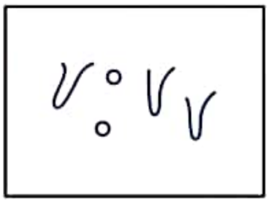
00:37:09

Estrogen	Progesterone
• On uterus → Growth of non-pregnant uterus	→ Growth of pregnant uterus
• on Endometrium → Proliferates	→ 1. Stops proliferation 2. Secretory action (Decidualisation) supports endometrium 3. If progesterone is given for a long time ↓ Endometrial Atrophy

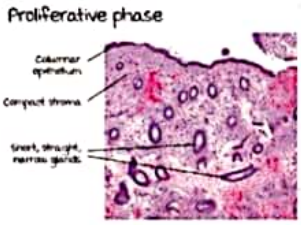
Active space

- Endometrial Biopsy

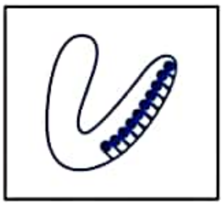
1st Half of cycle:



→ Glands:
Short
Simple
Cystic
Tubular

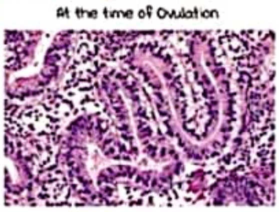

Proliferative phase
Columnar epithelium
Compact stroma
Short, straight, narrow glands

At ovulation



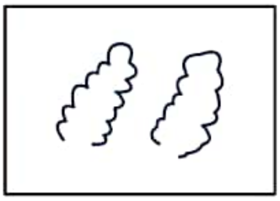
→ Glands begin to coil

→ Appearance of subnuclear vacuoles
↓
1st sign of ovulation on Endometrial Biopsy


At the time of Ovulation

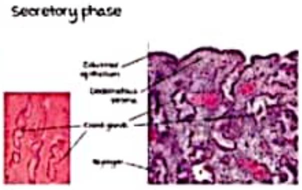
↓
Subnuclear vacuoles

2nd Half of cycle

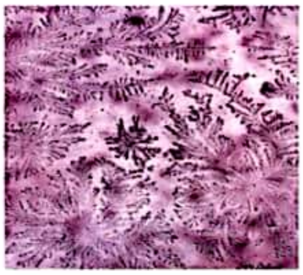


→ coiled glands
↓
Corkscrew appearance of glands or sawtooth appearance

1. Filled with secretion


Secretory phase
Columnar epithelium
Endometrial stroma
Coiled glands
Glycogen

- Cervical mucus:
  - → Thin, watery, copious, elastic can be stretched between fingers → Spinnbarkeit
  - → under microscope: Ferning
    - → due to ↑ Estrogen
      ↑ Na
      ↑ Cl
    - → Appears by day 8 of cycle →



→ Thick
viscous
Scanty
Breaks on stretching

→ Tack

→ Ferning is absent

→ Ferning disappears by Day-18 of cycle

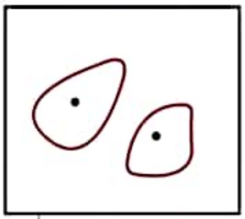
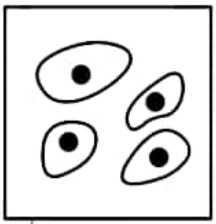
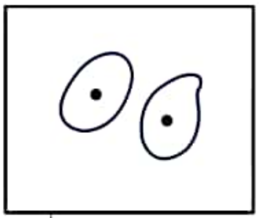
Active space

Effects of estrogen and progesterone on vaginal epithelium 00:54:44

Estrogen

Progesterone

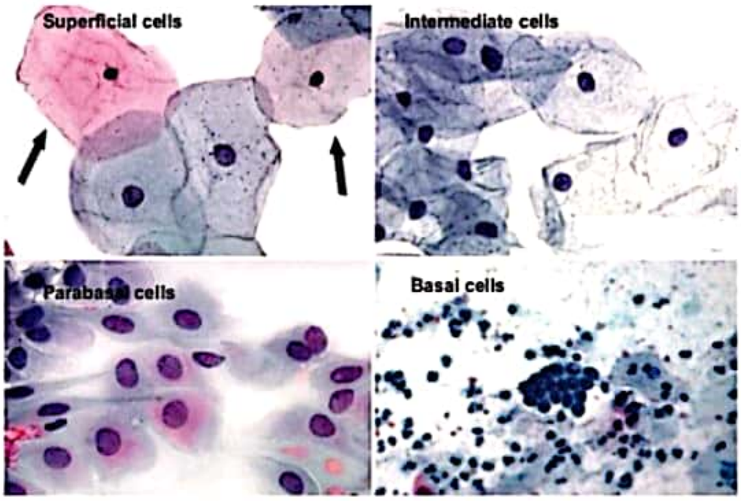
- Vaginal epithelium:

→ Estrogen predominates	→ No Hormone predominates	→ progesterone predominates
		
↳ Superficial cells	↳ Basal / parabasal cells	↳ Intermediate cells

• Pink coloured cells (Eosinophilic)
• Pyknotic nuclei
• Predominates in presence of Estrogen
• 1st half of cycle
	• Blue cells (basophilic)
	• Outlines are not distinct
	• Big nucleus
	• Predominates when no hormone is predominanty
	  • menopause
	  • Post partum
		• Blue coloured cells (Basophilic)
		• Nucleus larger than superficial cells
		• Distinct outlines
		• Predominate in presence of progesterone
		• 2nd half of cycle
		• Pregnancy

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Normal Cervical Cells



Leave Feedback

Important points

01:04:25

1. Sample for Hormonal study should be taken from: Lateral wall of vagina (upper 1/3rd part)
2. Sample for cytological study should be taken from: Posterior wall of vagina
3. Maturation index

$$\begin{tikzcd} & a:b:c \arrow[dl] \arrow[d] \arrow[dr] & \\ \text{Parabasal / Basal} & \text{Intermediate cells} & \text{Superficial cells} \end{tikzcd}$$

- Maturation index (MI)

At pregnancy	→ 0 : 95 : 5
Postpartum	→ 100 : 0 : 0
menopause	→ 100 : 0 : 0
Secretory phase	→ 0 : 70 : 30
Pre ovulatory phase	→ 0 : 40 : 60

4. Karyotypic index / Cornification index
   - No. of cornified squamous cells (due to estrogen)

Other effects of estrogen and progesterone

01:11:26

Estrogen	Progesterone
• On Fallopian Tube	
→ ↑ motility	→ ↓motility
→ ↓ secretions	→ ↑Secretions
• On Breast	
→ Ductal development	→ Glandular development
• On saltwater	
→ retention	→ Excretion

Active space

- On lipid profile
  - → ↑ HDL
    - ↑ Triglycerides
    - ↓ LDL
    - ↓ Cholesterol
    - ∴ cardio protective
- On Bones:
  - → ↑ Bone mass
  - → Epiphyseal closure
- On clotting factors:
  - → ↑ clotting factors 2, 7, 8, 10
    - ∴ Absolutely contraindicated in Thromboembolism, stroke, CAD

→ ↓ HDL
↑ LDL

Effects:

1. Smooth muscle Relaxant
2. ↑ Basal Body Temperature
   0.2 to 0.5° C
   or
   0.4 to 0.8° F

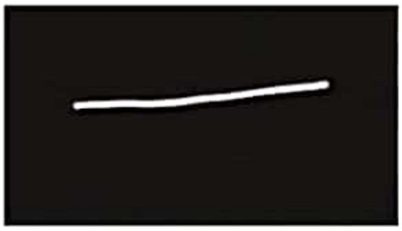
- Effect on FSH and LH
  - → Negative effect on FSH
  - → Estrogen
    - Low conc → negative effect on LH
    - High conc → positive effect on LH

→ Progesterone
- At ↓ concentration ↓ Positive effect on FSH, LH
- At ↑ concentration ↓ Negative effect on FSH, LH

USG appearance of endometrium

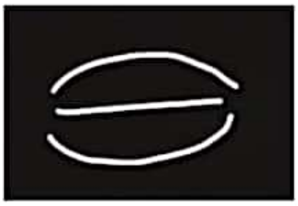
01:20:33

- USG Appearance of endometrium in different phases of cycle



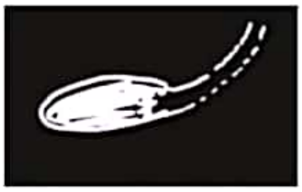
Proliferative phase:

→ Endometrium appears as thin white line



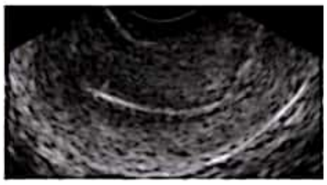
At ovulation:

→ Trilaminar appearance or Triple layered appearance

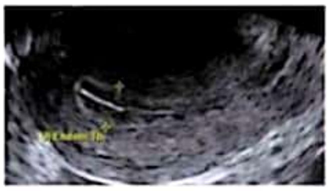


Secretory phase:

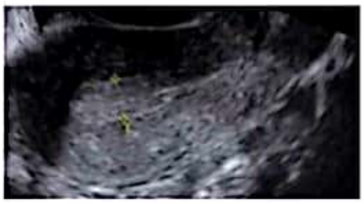
→ Thick white endometrium with a posterior enhancement



Proliferative phase



At ovulation



Secretory phase

HORMONES IN GYNAECOLOGY – 2

Drugs related to estrogen

00:00:12

- SERM act as agonist & antagonist
- Estrogen Antagonist

SERM

- Clomiphene citrate
  - Ovulation inducing drug
- Tamoxifen
  - management of Breast cancer
- Raloxifene
  - Managing osteoporosis
  - S/E: Hot flushes
- Omeloxifene
  - Active ingredient of centchroman / 'saheli'

	Tamoxifen	Raloxifene
1. Breast	→ Antagonist → DOC for treatment of ER ⊕ Breast cancer	→ Antagonist → DOC for prophylaxis in ER ⊕ Breast cancer
2. Lipid profile	→ Agonist	→ Agonist
3. Bone	→ Agonist	→ Agonist → Used in management of osteoporosis
4. Clotting factors	→ Agonist	→ Agonist
5. Uterine Endometrium	→ Agonist → Risk factor for endometrial cancer	→ Antagonist → S/E: Hot flushes

- FDA Approved: Bazedoxifene + Estrogen

Bazedoxifene → Antagonist of Estrogen on endometrium

Estrogen → Prevention against:

1. Osteoporosis
2. Hot flushes

Estrogen antagonist and hyper estrogenic conditions 00:08:54

- Progesterone (cheap): 1st line
- DOC: Continuous GnRH
- Danazol
  - Should not be used in young female, as it has androgenic side effects (Hirsutism)
- Gestrinone
- $\text{Androgens} \xrightarrow{\text{Aromatase}} \text{Estrogens}$

  $\uparrow \ominus$ Letrozole (Aromatase inhibitor)

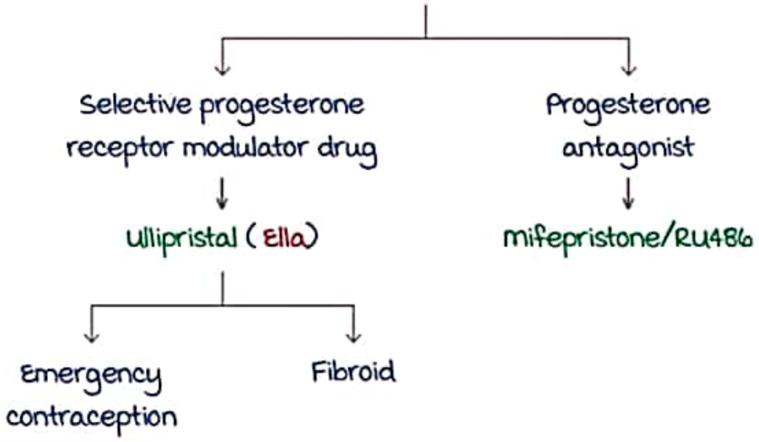
Hyper estrogenic conditions:

1. Endometriosis
2. Fibroid
3. Endometrial cancer
4. Ovarian cancer

Risk Factors	Protective Factors
1. Nulliparous ♀	1. Multiparity
2. Obese ♀ (except endometriosis)	2. Pregnancy
3. Early menarche	3. Physical exercise
3. Late menopause	4. Smoking (inhibits aromatase)

Drugs related to progesterone

00:16:55


Selective progesterone receptor modulator drug
Ulipristal (Ella)
Emergency contraception
Fibroid
Progesterone antagonist
Mifepristone/RU486

- Contraindication – Pregnancy
  – Liver disease

Active space

HIRSUTISM

Androgens in females 00:00:30

Androstenedione

Source:

Ovary (50%)

Adrenal gland (50%)

M.C androgen formed by ovary

Testosterone

DHEA and DHEA-S

DHEA: major source

↓

Adrenal

DHEA-S: Exclusively produced by Adrenals

Testosterone in females:

- Source → 25% – Ovary
  25% – Adrenal glands
  50% – Androstenedione

Testosterone
[2nd most potent androgen] $\xrightarrow{5\alpha \text{ reductase}}$ Dihydrotestosterone [most potent androgen]

- Normal: 20-80 ng/ml
- Binds to SHBG (Sex Hormone Binding Globulin)
  Albumin
- End product : Oxysteroid

SHBG

↑ Estrogen

↓

All – Androgens
India – Insulin
P – Progestin
G – Growth hormone
Council – Cortisol

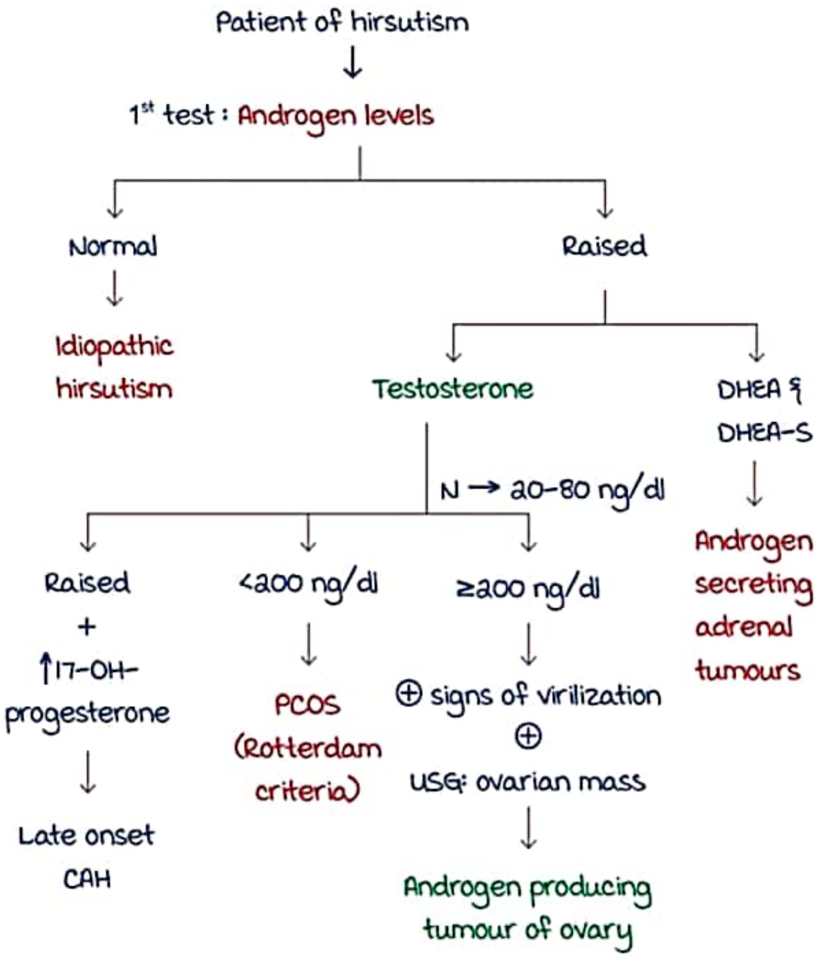
Hirsutism, virilisation, hypertrichosis

00:05:51

Hirsutism	Virilisation	Hypertrichosis
Excessive growth of male pattern / sexual hair	Entire spectrum of changes in a female exposed to androgens includes: Hirsutism Deepening of voice ↑ muscle mass clitoromegaly, Breast atrophy	Excessive growth of non-sexual hair all over the body
Scoring: Ferriman Gallwey score 11 sites Score: 0-4 → At each site modified Ferriman Gallwey score 9 sites (forearm, legs excluded) Score 0-4 Total score- ≥ 8: mild Hirsutism ≥ 15: Severe Hirsutism	Prader score: 0 → Female 5 → Virilization present	

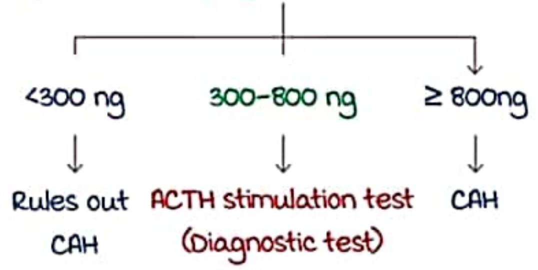
Work up in a patient of hirsutism

00:12:05


Patient of hirsutism
1st test : Androgen levels
Normal
Idiopathic hirsutism
Raised
Testosterone
DHEA & DHEA-S
Androgen secreting adrenal tumours
N → 20-80 ng/dl
Raised + ↑17-OH-progesterone
Late onset CAH
<200 ng/dl
PCOS (Rotterdam criteria)
≥200 ng/dl
⊕ signs of virilization ⊕ USG: ovarian mass
Androgen producing tumour of ovary

Late onset CAH (Congenital Adrenal Hyperplasia)

- CAH at the onset of puberty
- Screening test: 17-OH-progesterone


<300 ng
Rules out CAH
300-800 ng
ACTH stimulation test (Diagnostic test)
≥ 800ng
CAH

Early onset CAH	Late onset CAH
• more common	Less common
• Female exposed to androgen in intra-uterine life	Female exposed to excessive androgen at puberty

• External genitalia → Resemble male genitalia K.a ambiguous genitalia	External genitalia → Normal

Management of hirsutism

00: 22: 00

DOC: OCPs

Estrogen + Progesterone

Estrogen ↓ ↑SHBG ↓ ↓ free testosterone levels

Progesterone ↓ Negative feedback on LH ↓ ↓Androgen from theca cells

Normal: In females – Free testosterone → 1%

males – Free testosterone → 2%

In hirsutism: Free testosterone in females ↑

Note:

3rd or 4th generation progesterone used as OCP to treat hirsutism

Eg: Diane 35

Yasmin

Treatment

OCP × 6 months

↓ No response

Anti-androgen drugs

- Spironolactone (best)
  Cyproterone acetate
  Flutamide
  Finasteride

↓ No response

GnRH

In post menopausal women – Eflornithine cream

In young females – Laser removal of hair

Note:

Danazol → Cause hirsutism as adverse effect

∴ never used

M.C cause of hirsutism

- In a young female
  - ↓ PCOS > Idiopathic hirsutism
- Rapid onset hirsutism in a young female
  - ↓ Androgen producing tumour of ovary

PCOS

Polycystic Ovary Syndrome [PCOS] 00:00:10

- Aka Stein Leventhal syndrome
- Pathology: Excessive androgen production from ovary
- Androgen level: <200 nanogram

Features

↓ Hirsutism

↓ Male pattern baldness

↓ ↑LDL
↓HDL
Heart disease

- In adipose tissue:
  Excessive androgens convert into → Estrogen (E_1)
  Enzyme: Aromatase
- PCOS is mc in obese female
- In PCOS $E_2 : E_1 = 1 : 2$ [Normal – $E_2 : E_1 = 2 : 1$]

↑Estrogen

↓ Negative feedback on FSH → ↓FSH

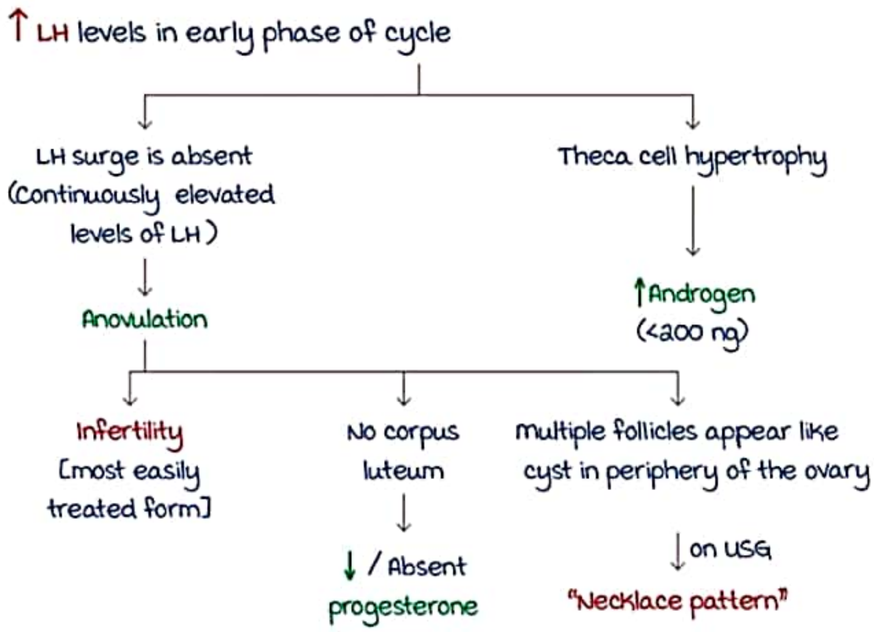
↓ Positive feedback on LH → ↑LH

↓ ↑Chance for:
① Endometrial Hyperplasia
② Endometrial cancer
③ Breast cancer
④ ± Ovarian cancer

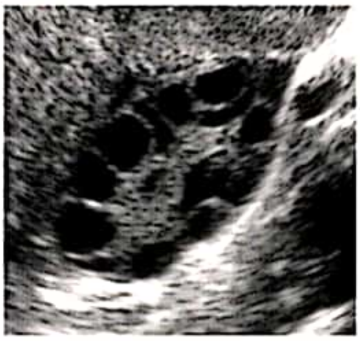
- In PCOS:

- FSH : LH = 1 : 2 or 1 : 3 (Normal – FSH < LH)
- Test done on: Day 2 to Day 4 of menstrual cycle

Active space


↑ LH levels in early phase of cycle
LH surge is absent (Continuously elevated levels of LH)
Theca cell hypertrophy
Anovulation
↑ Androgen (<200 ng)
Infertility [most easily treated form]
No corpus luteum
Multiple follicles appear like cyst in periphery of the ovary
↓ / Absent progesterone
on USG
"Necklace pattern"

- After puberty granulosa cells of small follicles secrete → Anti mullerian hormone
- In PCOS number of small follicles increased in ovary → ↑ Anti mullerian hormone
- → no corpus luteum, progesterone causes
  1) Secondary Amenorrhea
  2) Anovulatory / Irregular cycles (Painless)

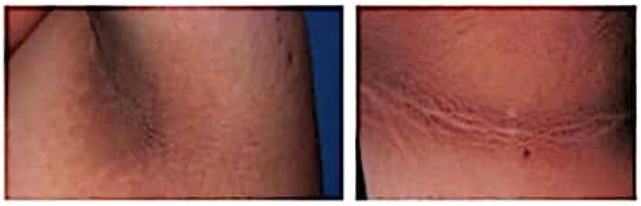


Insulin resistance

00:20:19

Manifested as:

Acanthosis Nigricans → Hyper pigmented skin in axillary area or nape of neck



- Investigations:

1) $\frac{\text{Serum fasting glucose levels}}{\text{Serum fasting insulin levels}} = < 4.5$ in insulin resistance

2) Serum insulin levels > 25 IU

- Complications:
  - Diabetes mellitus

ACOG Recommendation:

In PCOS patients with 75 gm of glucose levels → 2 hourly glucose tolerance test recommended

Hormones in PCOS

Increased	Decreased
LH	FSH
Androgens	Progesterone
Estrogen (E_1)	HDL
LDL	Sex hormone binding globulin (SHBG)
Anti Mullerian Hormone Insulin	

- In PCOS TSH, Prolactin, inhibin remains normal (↑ Prolactin, inhibin → only in few patients)

Diagnosis of PCOS

00:27:29

Rotterdam criteria:

- Any 2 of the following should be there to diagnose PCOS:

1) Hyperandrogenism → Clinically manifests as hirsutism
→ Biochemically ↑ androgen levels

2) Ovulatory dysfunction
  - Amenorrhea
  - Irregular cycles
  - Menometrorrhagia

3) USG evidence of PCOS: Either in one or both ovary
  i) ≥ 12 follicles in ovary
  ii) Follicles should be <1 cm (2-9 mm) in size
  iii) Volume of ovary ≥ 10 cc

- Obesity not a diagnostic criteria
- LDL:HDL ratio not a diagnostic criteria
- PCOS can be seen in thin females
- PCOS mc in reproductive age group, but can be seen in prepubertal age groups (rare)

Risk factor for PCOS in Prepubertal females :

1) Low birth weight
2) Early onset of Adrenarche (before 6 years)
3) Obesity with acanthosis nigricans
4) Heterosexual precocious puberty

- In PCOS:
  - Familial inheritance in seen
  - mc gene mutation → Cyp 21 gene
- Necklace pattern on USG is not diagnostic of PCOS
- Ovaries can appear normal on USG

Syndrome associated with PCOS

00:38:20

1) HAIR-AN Syndrome

Features:

- Hyperandrogenism
- Insulin resistance
- Acanthosis nigricans

2) metabolic X Syndrome:

Any 3 of the following 5 should be present to diagnose metabolic X syndrome:

i) Abdominal obesity
  [waist circumference > 88 cm or 35 inches]

ii) Triglycerides > 150 mg/dl

iii) HDL < 50 mg/dl

iv) BP ≥ 130/85 mmHg

v) • Fasting blood sugar → 110-126 mg/dl
  • 2 hour post prandial sugar → 140-199 mg/dl

Complications of PCOS 00:40:18

Short term complications
① Infertility
② Hirsutism
③ Irregular cycles

Long term complications
① Heart disease
② Endometrial carcinoma
③ Breast cancer
④ ± Ovarian cancer
⑤ Diabetus mellitus
⑥ Obesity causes
  - Sleep apnea syndrome
  - metabolic Syndrome
  - Depression
⑦ Non alcoholic steatohepatitis

- Osteoporosis does not occur due to → ↑ estrogen

Management of PCOS 00:45:33

- 1st step: weight reduction

Complications	Management
1) Insulin Resistance	DOC: metformin • mc complication: GI involvement • most dangerous: Lactic acidosis • Non teratogenic
2) Irregular cycles	• DOC: OCPs (Progesterone should be 3rd / 4th generation)
3) Hirsutism	• DOC: OCPs (Progesterone should be 3rd / 4th generation)

4) Infertility [due to anovulation] • Doc in PCOS Letrozole >clomiphene citrate • Doc in obese & Insulin resistance Letrozole > clomiphene citrate + metformin • Doc in PCOS patients with ↑ Prolactin levels Clomiphene citrate + Bromocriptine	1st line of management • Letrozole (DOC) • Clomiphene citrate (2nd best drug) • Bromocriptine (Ovulation including drug) 2nd line management 1) Human menopausal gonadotropin [hmG] 2) Laparoscopic ovarian drilling (theca cells of ovary is destroyed) 3rd line management synthetic GnRH in pulsatile manner

Side effects of ovulation inducing drugs:

1) multiple pregnancy
2) OHSS
3) menopause like symptoms

Laproscopic Ovarian drilling:

- Advantage: No risk of multiple pregnancy or OHSS
- Disadvantage: Premature ovarian failure

Clomiphene citrate

00:59:29

- Selective estrogen receptor modulator [SERM]
- 2 Isomers: Enclomiphene

Zuclomiphene → Antagonist of estrogen

↓

↓ levels of Estrogen

↓

Negative feedback on FSH lost

↓

↑ FSH levels

↓

Follicles starts maturing

Active space

- Prerequisite for clomiphene citrate: Intact hypothalamic pituitary axis
- Side effects:
  1) menopause like symptoms
  2) multiple pregnancy
- Initial dose: 50mg/day
- maximum dose : 100mg/day
- Schedule: From Day 2 to 6 or day 5 to 9 of the cycle.
- Follicular monitoring done from day 10 till the follicles becomes 18-20mm in size (size increase by 2-3 mm/day)
- Injection hCG → Acts like ovulation trigger
  Ovulation occurs after 32-36 hours
- Ovulation occurs in 60-70% patients on clomiphene citrate
  - Pregnancy rate is less due to: ↓ Estrogen

↓ Thin endometrium (does not favour implantation)

↓ Thick cervical mucus

Side effects:

1) menopause like symptoms → Hot flushes (due to ↓ Estrogen)

2) ↑ Ovulation → ↑ Chances of ovarian cancer
→ ↑ multiple pregnancy
→ ↑ OHSS

- If visual symptoms present → Stop clomiphene citrate

Letrozole v/s clomiphene citrate

01:10:50

Letrozole	Clomiphene citrate
• Aromatase Inhibitor	• Antagonist to Estrogen
• Prevents Androgen	• ↓ Estrogen levels
• Conversion to estrogen	• Thick cervical mucus
• mild ↓ Estrogen	• Thin endometrium
• Cervical mucus not thick	• ↓ Uterine blood flow
• Thick endometrium	
• ↑ Uterine blood flow	

Active space

ENDOMETRIOSIS

Endometriosis

00:00:15

- Definition

  Endometrial tissue [Glands + Stroma] outside uterine cavity

- Site
  - most common site - ovary
  - Ovary > Pouch of douglas > Uterosacral ligament > Broad ligament > Fallopian tube
  - Can occur anywhere in body
  - Rarest site - CNS
  - Can occur in scars of previous surgeries → Scar endometriosis
    - Caesarean section
    - Episiotomy
    - Pelvic floor repair
    - myomectomy

- Theories related to Endometriosis

i) Sampson's theory of implantation
  - most commonly accepted theory
  - Theory of retrograde menstruation

ii) mayer & Ivanoff - Theory of coelomic metaplasia

iii) Halban - Theory of metastasis.

- Risk factors & Protective factors

  related to excessive estrogen

- Risk factors
  - Obesity
  - Nulliparous
  - Early menarche & Late menopause
  - Late marriage & late child birth
  - High socioeconomic status

Protective factors
  - multiparity
  - Pregnancy
  - Smoking
  - Physical exercise

Note:

- Gene involved - K-RAS
- most common age - $\geq$ 30 yrs
- Endometriosis in puberty → Rule out mullerian malformation

Endometriosis - clinical presentation

00:11:27

- most common symptom → Pain
- 2nd most common → Infertility
- 3rd most common → Endometrioma / Chocolate cyst in ovary
- 4th most common → menstrual symptoms.

i) Pain:

- most common symptom
- most common type → 2° dysmenorrhoea
  2° dysmenorrhoea > Chronic pelvic pain > Dyspareunia > Low back ache
- Reason for pain :
  a) Congestion
  b) Prostaglandins
- Pain is related to depth of lesion

management of pain in endometriosis

medical management

mild / minimal

- Treated like 1° dysmenorrhoea
  1. NSAID
  2. OCP [Cycle becomes anovulatory]

moderate / Severe

- Treat the disease pathology
- Aim : to ↓ estrogen
- Drugs
  1. Progesterone (Cheapest)
  2. GnRH (Best) - given continuously
  3. Letrozole [Aromatase inhibitor]
  4. Danazol → Hirsutism
     ∴ not preferred
  5. Gestrinone
  6. mifepristone → Endometrial Atrophy

Other symptoms in endometriosis

00:21:35

ii) Infertility:

- 2nd most common symptom in endometriosis
-

Infertility

mild infertility

Reason :

- Inflammation → ↑ Cytokines
- Hormonal imbalance (↑estrogen)
- Endometriotic tissue → Embryotoxic

management :

management of unexplained infertility

- Clomiphene citrate + IUI

↓

[Intrauterine insemination]

moderate / Severe

Reason

Adhesions between tube & uterus , tube & peritoneum

management:

IVF (In Vitro Fertilization)

iii) Endometrioma

- most common site of endometriosis → Ovary [30 – 40% cases]
- Bilateral involvement of ovary
- Ovary filled with blood

↓

Hemosiderin ⇒ Chocolatey / Tarry blood ⇒ Chocolate cyst

- Cyst is lined by pseudo xanthoma cells
- Cyst size ≤ 12 cms

management

- Cannot be managed medically
- Surgical management → Laparoscopic surgery

< 3cm

Laparoscopic electrocoagulation

≥ 3cms

Laparoscopic cystectomy

Active space

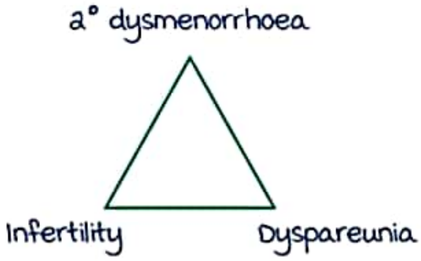
- Sites where endometriosis cannot be medically managed
    1. Ovary
    2. Bowel
    3. Urinary system

ii) menstrual symptoms

- menorrhagia [↑ estrogen → endometrial proliferation → shedding of endometrium]

One liners 00:33:20

1. Clinical triad:



2. Per vaginal examination
    i) Fixed retroverted uterus
    ii) Adnexal mass
    iii) Nodules on uterosacral ligament
        - Cobblestone appearance

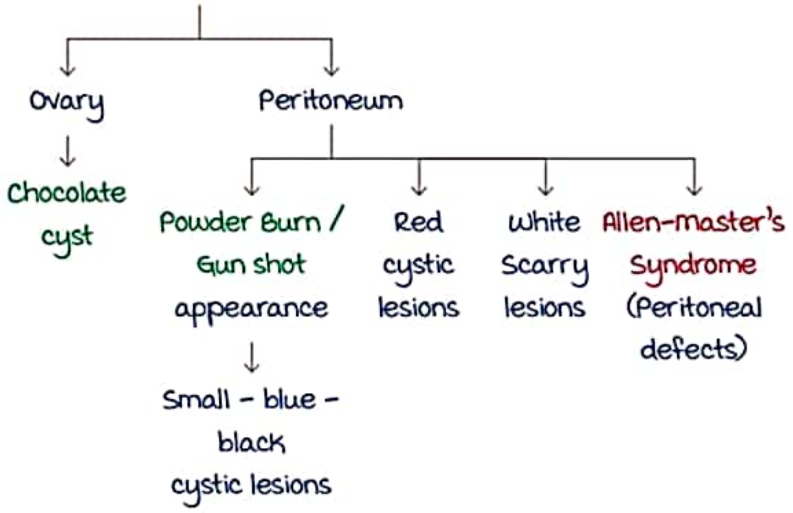
Endometriosis - investigations 00:35:01

i) 1st investigation

- TVS [Trans vaginal Sonography] → Chocolate Cyst [Ground Glass appearance]

ii) IOC [Investigation of Choice]

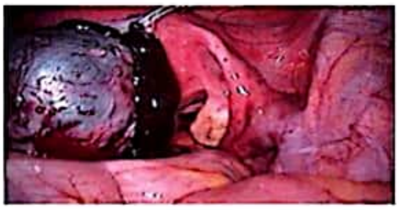
- Laparoscopy

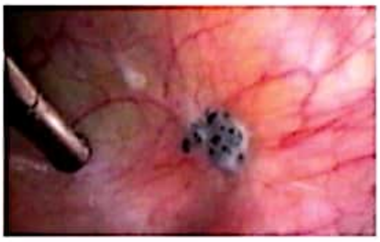


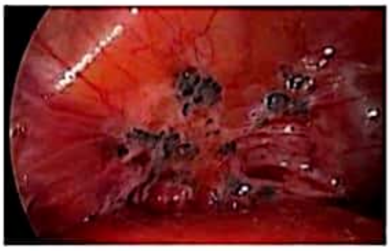
Ovary → Chocolate cyst

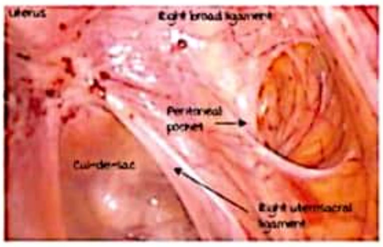
Peritoneum →

- Powder Burn / Gun shot appearance → Small - blue - black cystic lesions
- Red cystic lesions
- White Scarry lesions
- Allen-master's Syndrome (Peritoneal defects)









Uterus
Right broad ligament
Peritoneal pocket
Cul-de-sac
Right uterosacral ligament

iii) Gold standard

- HPE [Histo Pathological Examination]

Note:

- CA - 125 level is ↑↑ in endometriosis.

Endometriosis - management 00:41:20

i) medical management

main symptom of endometriosis - Pain ⇒ managed medically

ii) Surgical management

- Indications:
  - If Patient has intolerance to pain

  - Not responding to medical management
  - Ovary (chocolate cyst) / Bowel / urinary system involved

- Techniques:
  - Adhesiolysis.
  - Fulguration of lesions
  - LUNA – Laproscopic Uterosacral Nerve Ablation
  - TAH (Total Abdominal Hysterectomy) + BSO (Bilateral Salpingo – oophorectomy)

Adenomyosis

00:44:44

- Endometrial tissue is present inside myometrium
  ∴ earlier known as endometriosis interna
- Age: ≥ 40yrs
- more common in multipara
- most common symptoms – 2° dysmenorrhoea + menorrhagia

I. Investigations

- 1st investigation – TVS
- IOC – MRI
- Gold standard – HPE

Findings

- On TVS
  i) myometrium → Salt & Pepper appearance [Heterogenous appearance]
  ii) myometrial cyst
  iii) Subendometrial striations → Venetian blind appearance

- on MRI
  i) Thickness of junctional zone between endometrium & myometrium increases [≥ 12mm]
  ii) Normal, thickness is 5mm

- On HPE
  i) Endometrial glands seen inside the myometrium [Glands ≥ 2.5 mm deep, below the junctional zone]
  ii) myometrial hyperplasia & hypertrophy

- Per Vaginal
  - i) Symmetrically enlarged uterus
    size - 10 - 12 weeks pregnant uterus size
  - ii) Halban sign - Tender uterus
  - iii) mobile uterus

2. management

TAH + BSO

Active space

FIBROIDS

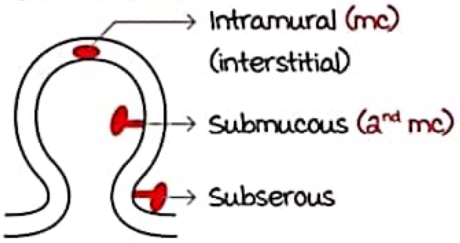
- m.c pelvic tumour in female
- m.c solid benign tumour in female
- Smooth muscle benign tumour of uterus
- Estrogen + progesterone dependent tumour
- m.c age = 35-45 years
- monoclonal in origin (originates from single myocyte)
- 40% fibroids → Genetic / Chromosomal abnormality
  → m.c chromosomal abnormality: Translocation (b/w chr 12 & 14)
  → Followed by: Deletion of chromosome 7
- Gene mutations present in fibroid: MED 12 and HMGA 2 gene
- Familial inheritance seen (2.5 times ↑ risk with 1° relative)
- Estrogen dependent:
  m.c → Nulliparous female
  m.c → Obese female
  Smoking → Protective
- m.c in African female
- Effect on fibroids:
  → OCP: no effect
  → Pregnancy: no effect
  → menopause: ↓ size (if size ↑, suspect malignancy)

Classification of fibroids 00:05:20

- Types

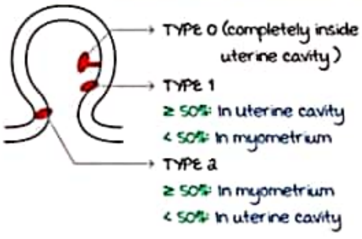
m.c Intrauterine

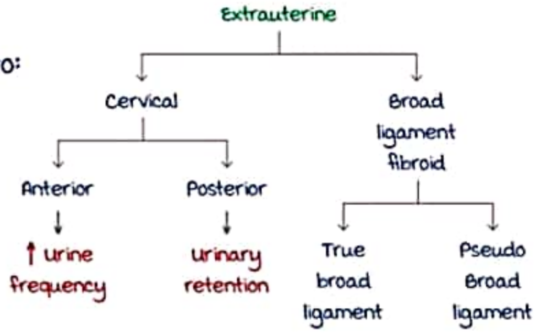
Extra uterine



Active space

→ Submucous fibroids are further classified into:


TYPE 0 (completely inside uterine cavity)
TYPE 1
≥ 50% In uterine cavity
< 50% In myometrium
TYPE 2
≥ 50% In myometrium
< 50% In uterine cavity


Extrauterine
Cervical
Broad ligament fibroid
Anterior
Posterior
↑ urine frequency
urinary retention
True broad ligament
Pseudo Broad ligament

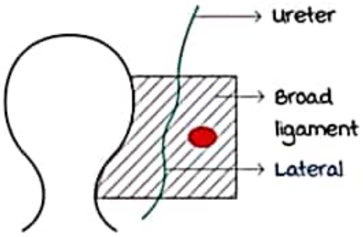
→ Type 0 and Type 1: Removed Hysteroscopically

→ Type 2: Cannot be removed Hysteroscopically

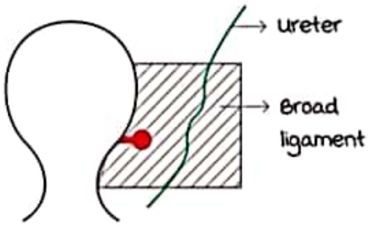
True and pseudo-broad ligament fibroid

00: 10: 55

True Broad ligament Fibroid


ureter
Broad ligament
Lateral

Pseudo Broad Ligament Fibroid


ureter
Broad ligament

True Broad ligament Fibroid	Pseudo Broad Ligament Fibroid
1. Lies lateral to ureter	1. Lies medial to ureter
2. Non-pedunculated	2. Pedunculated
3. Never covered by pseudocapsule	3. Covered by a pseudocapsule

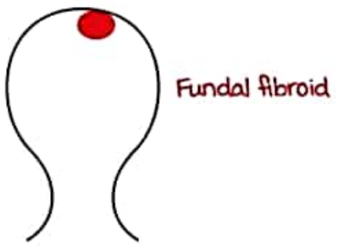
→ Can get polycythemia instead of anemia

Important points on Fibroids:

- m.c variety of uterine fibroid : Intramural fibroid
- To begin with all fibroids are : Intramural fibroid
- m.c fibroid causing symptoms : Submucous fibroid
- m.c fibroid causing abortion : Submucous fibroid
- m.c fibroid causing infertility : Submucous fibroid
- m.c fibroid to undergo malignant transformation : Submucous fibroid
- m.c fibroid to undergo torsion : Pedunculated subserous fibroid

Active space

- m.c fibroid to undergo calcification:
  Pedunculated subserous fibroid → Subserous fibroid on calcification
  - Womb stone
  - Popcorn calcification
- m.c fibroid to cause urinary symptoms: Cervical fibroid
- m.c fibroid leading to uterine inversion:

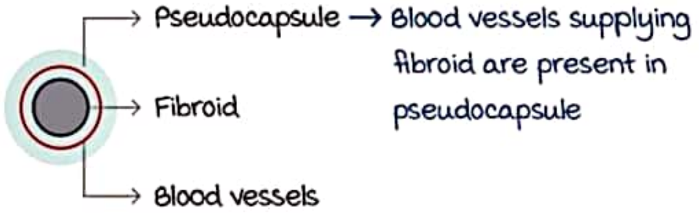

Fundal fibroid

- Wandering Fibroid : Pedunculated subserous fibroid with no connection to uterus

Structure of a fibroid

00: 21: 38

- Rubbery consistency
- Whorled appearance
- covered by pseudocapsule


Pseudocapsule → Blood vessels supplying fibroid are present in pseudocapsule
Fibroid
Blood vessels

most vascular part
↓
Periphery of fibroid
↓
Calcification begins from periphery

Least vascular part
↓
Center of fibroid
↓
Degeneration begins from center

- No mitotic activity is seen in a Fibroid
- If mitotic activity is present (≥ 10 mitosis/HPF)
  ↓
  malignant

- m.c degeneration: Hyaline degeneration
- Calcareous degeneration / Calcification: (m.c) subserous fibroid
- Cystic degeneration in post-menopausal female
- Red degeneration: Specific in pregnancy (2nd trimester)
- Least common change: Malignant transformation (0.2-0.5%)
- m.c malignancy: Leiomyosarcoma
- m.c Fibroid: Submucous fibroid
- Histopathological examination (HPE)
  - → Loses its pseudocapsule
  - → Whorled pattern lost
  - → mitosis present
- Clinically: ↑ size, Painful (signs of malignant transformation)

Red degeration of fibroid

00: 29: 15

- Specific to pregnancy (m.c → 2nd trimester)
- Aseptic thrombosis in the blood vessels which supply fibroid

↓

Aseptic Necrosis of fibroid

↓

C/F → pain in abdomen, nausea, vomiting

↓

On HPE : Salmon pink in colour

- Investigation :
  - → Aseptic but still presents with: Fever, ↑ WBC, ↑ ESR } Reactionary changes
- Management:

Do's
- → Conservative management
- → Analgesics
- → Anti emetics
- → Rest

Dont's
- → No Antibiotics
- → Do not terminate pregnancy
- → Do not do myomectomy

Clinical presentations of fibroid

00:34:09

- m.c presentation: Asymptomatic
- m.c symptom: menstrual symptoms

m.c ↓ menorrhagia

If metrorrhagia (irregular bleeding) ↓ Fibroid polyp

Never leads to Amenorrhea

- Pressure symptoms
  - → On vein / Lymphatics: Varicose veins / Edema
  - → Intestine & rectum: Dyspepsia / Constipation
  - → Urinary retention
- Fibroid doesn't lead to pain in abdomen
- If pain is the primary complaint:
  - → Torsion
  - → Red degeneration
  - → Malignant transformation
- Fibroids can lead to dysmenorrhea
- Fibroids can never lead to secondary dysperunia

i- submucous fibroids - interferes with the ascent of the sperms

ii- if fibroid near to the angle of uterus-blocks tubal ostia

iii- hinders with implantation

- 3% cases → Infertility

Effects of fibroid on pregnancy

00:41:38

1. Infertility
2. ↑ Abortion
3. ↑ preterm labour
4. ↑ Abruptio placenta
5. malpresentation
6. ↑ PPH
7. ↑ subinvolution

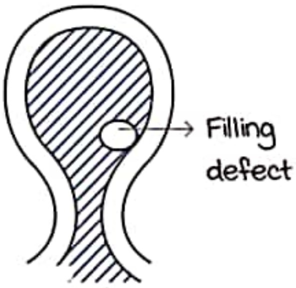
Active space

Investigation and differential diagnosis of fibroids 00:45:43

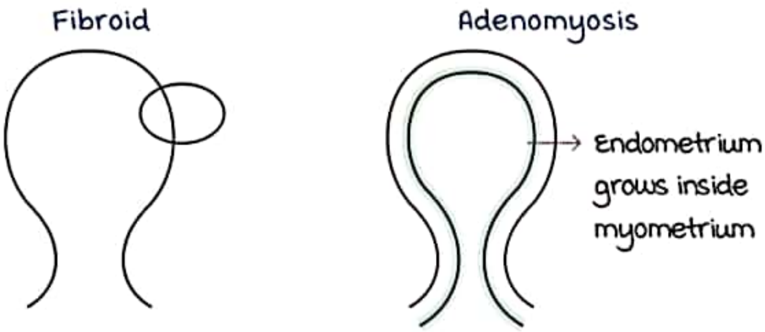
- Investigation of choice for fibroid: USG (TVS)
- For small submucous fibroid

  ↓

  Hysteroscopy (invasive test)
- Saline infusion sonography
- HSG (filling Defect) for submucosal fibroids



- Differential diagnosis of Fibroid: Adenomyosis



1. m.c complaint: menorrhagia	1. m.c: menorrhagia + dysmenorrhea
2. Age: 35-45 years (Reproductive age)	2. Age: ≥ 45 years
3. Nulliparous	3. multiparous
4. Irregularly enlarged uterus	4. Symmetrically enlarged uterus
5. Size of uterus: 16-20 weeks pregnant uterus	5. Size of uterus: 10-12 weeks pregnant uterus
6. Uterus is non-tender	6. Tender uterus → Halban sign
7. IOC: USG	7. IOC: MRI

Management of fibroid

00:52:33

- Asymptomatic
  - → Follow up by annual pelvic examination (irrespective of their size)
  - → Indication for surgery in asymptomatic fibroid
    1. torsion of pedunculated fibroid
    2. Size of fibroid increasing
    3. Suspecting malignancy
- Symptomatic
  - Best
    - Surgery
  - medical management
    - → Indications:
      - Patient refuses surgery
      - Contraindication to surgery
      - Correct anemia before surgery
      - Reduce size of fibroid before surgery
      - Patient nearing menopause
  - Uterine Artery Embolisation (UAE) or magnetic Resonance guided High intensity Focused ultrasound (MRgHIFU)
    - Only in female who have completed their family

Surgical management of fibroid

00:52:33

- Remove uterus + Fibroid
  - Type 1 Hysterectomy / Total Abdominal Hysterectomy (TAH)
  - → Indications for TAH
    1. Age of patient ≥ 40 years
    2. Family complete
    3. Excessive bleeding at the time of myomectomy
    4. Fibroid is associated with malignancy
- Remove fibroid
  - myomectomy
  - → Indications:
    1. If family not complete
    2. Case of recurrent abortion with fibrosis
    3. Case of infertility with fibroids

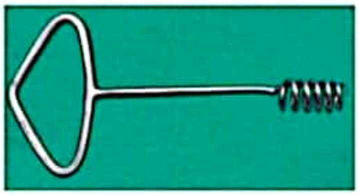
Active space

Myomectomy 01:04:40

- Prerequisites :
  1. Anemia should be corrected
  2. Arrange for blood
  3. Consent for TAH
  4. Husband's semen analysis should be Normal
  5. Hysteroscopy + Endometrial biopsy if in case of irregular cycles to rule out polyp / endometrial cancer

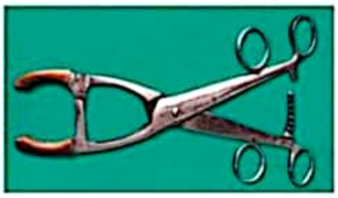
- Timing:
  - → Post menstrual phase
  - → Never to be done during pregnancy
- methods to ↓ blood loss during myomectomy:
  1. Pre operatively = GnRH → ↓ vascularity of fibroid
  2. Time: immediate post menstrual phase
  3. Hypotensive anesthesia
  4. Inject vasopressin to serosa overlying the myoma
  5. Tie Torniquet to the uterine Artery (≥ 45 min: Release intermittently)

Bonneys myoma screw



used to hold fibroid

Bonneys myoma clamp



used to release the blood supply intermittently

Myomectomy - contraindications & routes 01:11:22

contraindications
1. Large broad ligament fibroid
2. Small multiple fibroid in uterus
3. Associated with genital TB
4. During pregnancy

- Routes of myomectomy

Abdominal / Laparoscopic myomectomy

→ laparoscopic myomectomy is preferred:

- ↓ Blood loss
- ↓ morbidity
- ↓ hospital stay
- Early resumption of normal activities

→ Earlier: Only disadvantage of laparoscopic myomectomy

↓

↑ Chances of recurrence

→ Laparoscopic myomectomy:

1. Intramural fibroid
2. Subserous fibroid
3. Type 2 submucous fibroid
4. No. of fibroids < 4
5. Size of fibroid < 10 cm

Hysteroscopic myomectomy

↓

Type 0, Type 1 Submucous fibroids

Hysteroscopy

01:18:09

- Used to visualise inside the uterine cavity
- Always use a distension media

Diagnostic

↓

CO_2

Operative Hysteroscopy

↓

Fluid

Hypotonic Fluid (Fluid poor in electrolytes)

5% → Mannitol

3% → Sorbitol

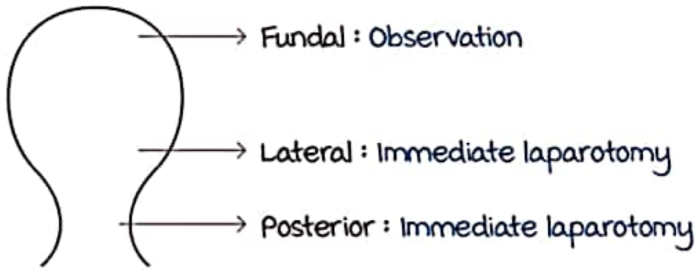
1.5% → Glycine

Isotonic fluid (Rich in electrolyte)

→ Normal saline

Active space

- m.c complication: Perforation


Fundal : Observation
Lateral : Immediate laparotomy
Posterior : Immediate laparotomy

- 2nd m.c complication: Fluid overload

(Reported as fluid deficit)
↓
Hyponatremia
↓
Cerebral edema

Media	Alert	Stop procedure
Hypotonic media	500 ml	1000 ml
Isotonic media	1000 ml	2500 ml

- Patients who have completed their family:

Uterine Artery Embolisation
→ Via Femoral Artery using polyvinyl alcohol / gel foam

MRgHIFU
→ MRI room x 2-3 hours
→ High intensity ultrasound waves are focused on fibroid
→ Contraindications:
  - Size of fibroid > 10 cms
  - Size of weight > 24 weeks
  - Obstruction in path of rays: Bowel / foreign body

- Fibroid slowly - shrinks in size
- Not done in female planning to conceive in future

Medical management of fibroid 01:30:00

- ↓ Blood loss, but no effect on size of fibroid
  1. Tranexemic Acid
  2. Progesterone
  3. OCP
- ↓ size of fibroid, eventually ↓ blood loss
  - ↓ Estrogen
    - Continuous GnRH
    - Letrozole
    - Danazol
    - Gestrinone
  - ↓ progesterone
    - Ulipristal
    - mifepristone

Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

FIGO classification of fibroid 01:36:07

Type:

0, 1, 2 } Sub mucous fibroid

3, 4 } Intramural fibroid

5, 6, 7 } Subserous fibroid

8 → Extrauterine fibroid = Broad ligament fibroid

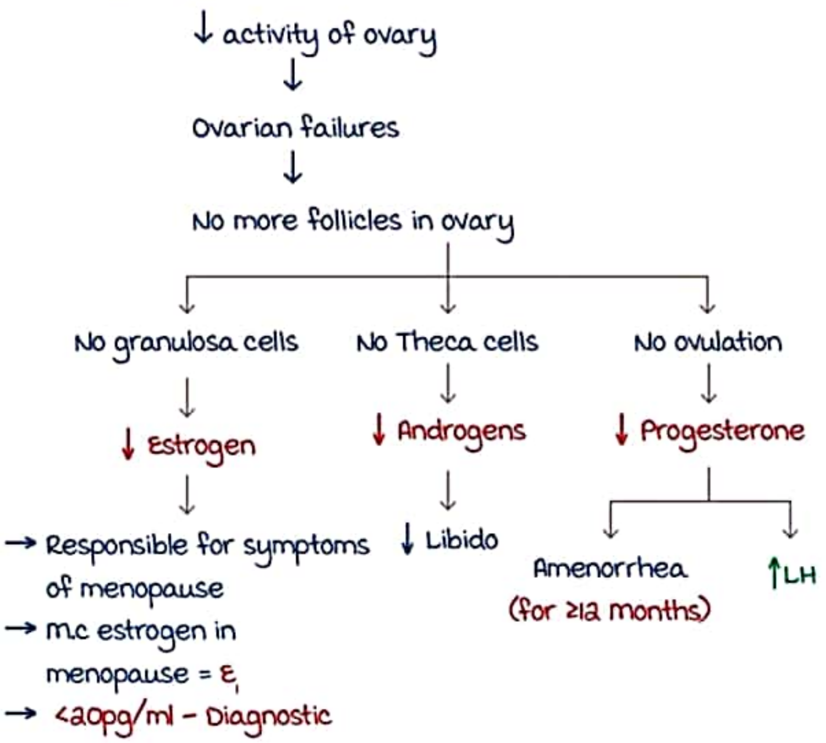
MENOPAUSE

- Cessation of periods for 12 months atleast, which is permanent
- Age : 51 years (mc)
  In India → 47 years
- Period from 39 years to 51 years → Perimenopausal period
- Premature menopause → < 40 years
  Late menopause → ≥ 55 years

Pathophysiology of menopause

00:02:57

- Pathophysiology :

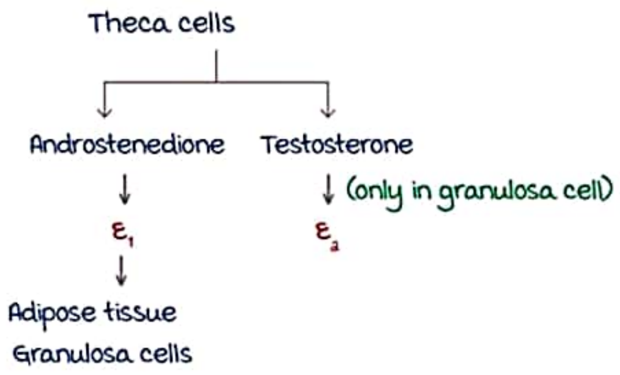


↓ activity of ovary
↓
Ovarian failures
↓
No more follicles in ovary

No granulosa cells → ↓ Estrogen
→ Responsible for symptoms of menopause
→ m.c estrogen in menopause = E_1
→ <20pg/ml – Diagnostic

No Theca cells → ↓ Androgens → ↓ Libido

No ovulation → ↓ Progesterone → Amenorrhea (for ≥12 months), ↑LH



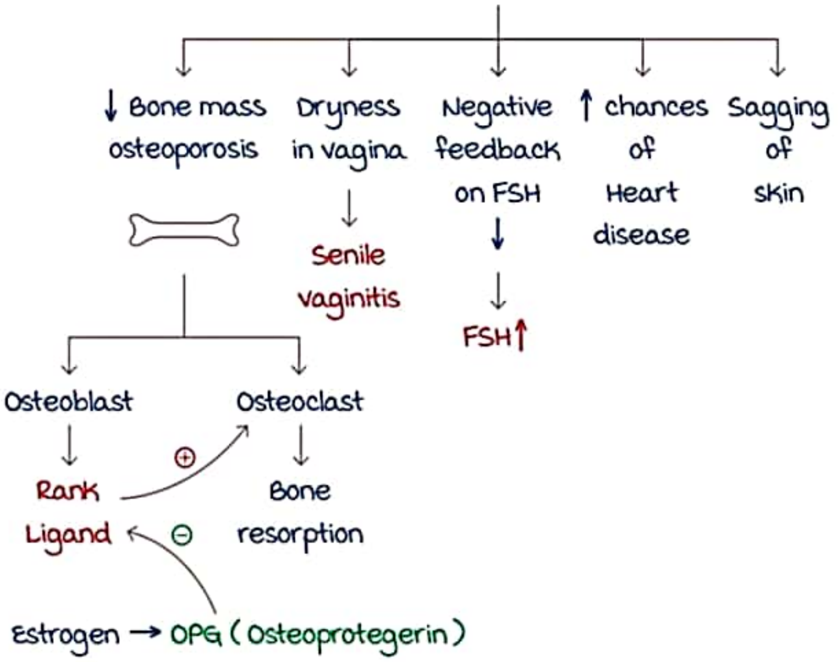
Theca cells

Androstenedione → E_1 → Adipose tissue, Granulosa cells

Testosterone → (only in granulosa cell) E_2

- Adrenal Gland: Androgen in $\xrightarrow[\text{Tissue}]{\text{Adipose}}$ E_1

Decreased estrogen in menopause 00:10:24


↓ Bone mass osteoporosis
Dryness in vagina
Senile vaginitis
Negative feedback on FSH ↓
FSH↑
↑ chances of Heart disease
Sagging of skin
Osteoblast
Osteoclast
Rank Ligand
⊕
⊖
Bone resorption
Estrogen → OPG (Osteoprotegerin)

Diagnostic test /sine qua non for menopause 00:17:00

- ↑ FSH Levels = ≥40 μ/L
- In a menopausal female: serum LH and serum FSH are raised

↓

Excreted through urine

↓

Human menopausal Gonadotropin (HMG) { Synthetic LH + FSH

↓

- multifetal pregnancy = 30%
- Risk of Ovarian Hyper stimulation Syndrome = 5%

- most characteristic symptom of menopause

↓

Hot flushes (vasomotor symptoms)

↓ Estrogen

Coincides with LH surge

80% of menopausal females

Management of menopause

00:23:03

- management: Hormone Replacement Therapy (HRT)
  - Indicated in all menopausal females who are experiencing symptoms of menopause
  - Special indications:
    1. Premature menopause
    2. menopouse due to surgery or radiation
    3. Gonadal dysgenesis (eg : Turner syndrome)
  - M.C Indication: Hot flushes
- If female uterus is intact: Estrogen + Progesterone (HRT)

↓

Oral / Transdermal

↓

Protect from endometrial cancer

- If uterus is absent: Only Estrogen

	Standard Dose	Low Dose
- Conjugated Estrogen	0.625 mg	0.3/0.4 mg
- micronized Estrogen	1 mg	0.5 mg
- Ethinyl estradiol	5 mcg	2.5 mcg
- medroxyprogesterone Acetate	5 mcg	2.5 mg

- Indications of Transdermal Estrogen patch in HRT
  - ↑ Risk of Thromboembolism
  - Triglycerides
  - Obese with metabolic X Syndrome

- HRT can also be used for:
  - Senile vaginitis
  - Osteoporosis

- HRT is not used to ↓ incidence of coronary heart disease

Active space

Management of osteoporosis : review

00:31:09

- 1st line management: Non – Hormonal drugs

↓

Bisphosphonate like Alendronate

- 2nd line management:
  - HRT → Uterus is intact: Estrogen + Progesterone
    → Uterus is absent: only Estrogen
  - Tibolone (estrogen + progesterone like activity)
  - SERM → Raloxifene

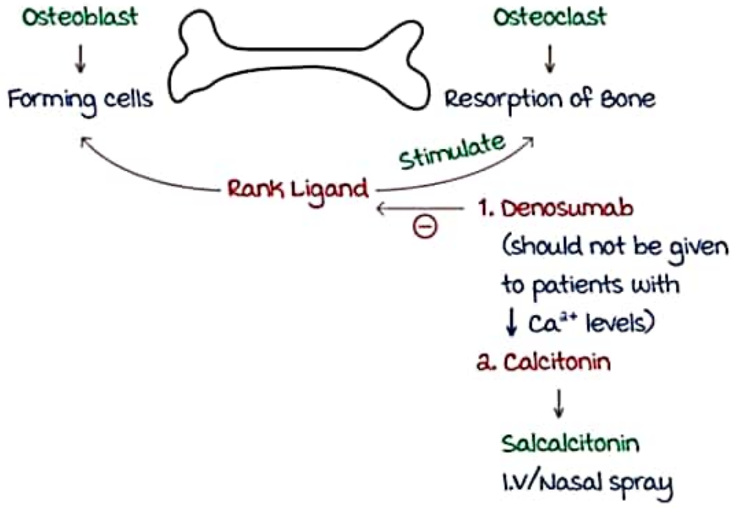
Osteoporosis

- ↓ bone mass
  ↓
  ↑ chance of fracture
  ↓
  m.c.= vertebral compression fracture
  - Colle's Fracture
  - Fracture of femur neck

- Screening is done in female = ≥ 65 years
  ↓
  DEXA scan
  - measure bone mineral density
  Compare with
  - Female of Her age ↓ Z score
  - Young female ↓ T score

Management of osteoporosis - denosumab & calcitonin

00:35:47


Osteoblast
Forming cells
Osteoclast
Resorption of Bone
Stimulate
Rank Ligand
⊖

1. Denosumab (should not be given to patients with ↓ Ca^{2+} levels)
2. Calcitonin
   ↓
   Salcalcitonin
   I.V/Nasal spray

Management of osteoporosis- bisphosphonates, SERM/estrogen 00:41:39

3. Bisphosphonates
  - Alendronate
  - Ibandronate
  - Risedronate

  } Orally
  - Zoledronate → IV
  - 1st line of treatment of osteoporosis
  - Side effect: Gastritis
  - Lead to → Osteonecrosis of jaw (rare) in long term use

4. SERM / Estrogen
  - Raloxifene
    1. ↓ fracture by 50%
    2. ↑ HDL, ↓ LDL } 10%
    3. ↓ Breast cancer
    4. ↓ No effect on uterine cancer
  - Side effect: Hot flushes (↑ chance of thrombosis)
  - SERM: Bazedoxifene + Estrogen } Approved by FDA

osteoporosis + Hot flushes

Parathyroid hormone & drugs used in osteoporosis 00:47:53

- At low concentration parathyroid hormone stimulates osteoblast

  ↓

  ↑ Bone formation

  At high concentrations – ↑ RANK ligand – stimulates osteoclasts

  ↓

  ↑ Serum Ca^{2+}

- Synthetic parathyroid hormone → Teriparatide
  - Acts on osteoblast
  - Low pulses / Amplitude
  - Can lead to osteosarcoma in bone
  - Should not be used ≥ 2 years

Classification of drugs used in osteoporosis

Prevent	Treating	Both
→ Calcium • Daily requirement of ca: ♀ 31-50years = 1000mg ♀ ≥51years = 1200mg → Vit D intake • Low risk ♀ = 600IU/day • High risk ♀ = 800IU/day	→ Denosumab → Salcalcitonin → Teriparatide	→ HRT → Tibolone → Bisphosphonate → SERM

Hot flushes and senile vaginitis

00:54:31

- 1st line management: HRT

Uterus intact ↓ Estrogen + progesterone

Uterus absent ↓ Only estrogen

- 2nd line management:
  - Tibolone
  - SSRI → Fluoxetine
    Venlafaxine
  - Clonidine α_2 Adrenergic agonist (Side effects dry mouth, Constipation)
  - Gabapentin
  - Phytoestrogen soy proteins, flax seed

- Raloxifene: Cannot be used to treat hot flushes

- SERM can be used: Ethinyl Estradiol + Bazedoxifene

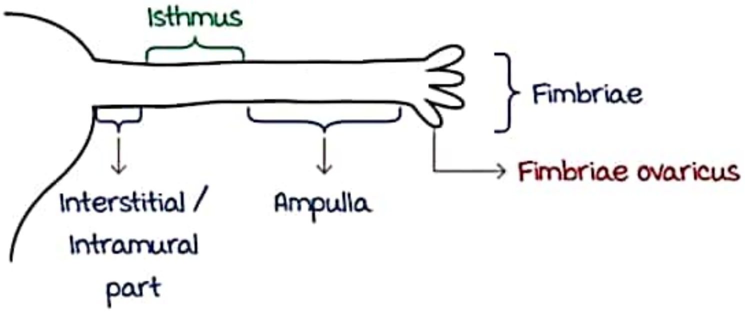
Senile vaginitis

- Estrogen cream → Premarin for local application
- If symptom less → lubricants (K - Y jelly) can be used

ANATOMY OF FEMALE GENITAL TRACT: FALLOPIAN TUBE AND OVARY

Fallopian tube

00:00:15



Length of tube: 7-12 cms (average : 10 cms) or 4 inches

Part of tube	Important points
1. Intramural part	1.25 cm long (narrowest part) 0.7 to 1 mm in diameter lacks longitudinal muscle fibres, made only of circular fibres anatomical sphincter
2. Isthmus	2.5 cm long 1-2 mm in diameter and narrowest part physiological sphincter
3. Ampulla	5 cm long longest & widest part max.number of mucosal folds / plicae
4. Fimbriae	1.25 cm long

One liners:

- Fertilization occurs in → Ampulla
- Ectopic pregnancy m.c in → Ampulla
- max plicae/mucosal folds → Ampulla
- Part cut during tubectomy → Isthmus
- Reversal of tubectomy best in → Isthmo-isthmic anastomosis
- TB causes block in → cornual end of tube
- Gonococcus causes block in → Fimbrial end of tube

Active space

Lining of the tube

00:08:18

Lining: Ciliated columnar epithelium

M.C variety of Ca: Adeno Ca

Movement of zygote towards uterine cavity is due to:

1. Peristalsis of tube
2. Movement of cilia

Cells in fallopian tube

- Ciliated columnar cells
- Secretory cells
  - ↓ Pyruvate secretions
  - ↓ Provides nutrition to early zygote
- Peg cells

Blood supply:

Medial part → Uterine artery

Lateral part → Ovarian artery

Lymphatic drainage:

Para-aortic LN

Along cornual end

↓

Along with round ligament

↓

Superficial inguinal LN

Nerve supply: T_{11}, T_{12}, L_1

In unruptured ectopic → Pain due to stretching of tube

↓

T_{11}, T_{12}, L_1

Development:

Unfused parts of mullerian ducts

Ovary 00:14:48

Length : 2 to 5 cms

Width : 1.5 to 3 cms

Thickness: 0.5 to 1.5 cms

Weight : 5–10 gms

Volume : Average volume in reproductive age female: 7–8 cc
maximum volume → 20 CC
Post – menopausal → 3–4 CC (average)
maximum → 10 CC

Location: Ovarian fossa (of waldeyer) in lateral pelvic wall

In intrauterine life: Located near T_{10} segment
↓
Ovary descends into pelvis with help of gubernaculum

- Uterus divides gubernaculum into 2 parts

Proximal part → Forms ovarian ligament

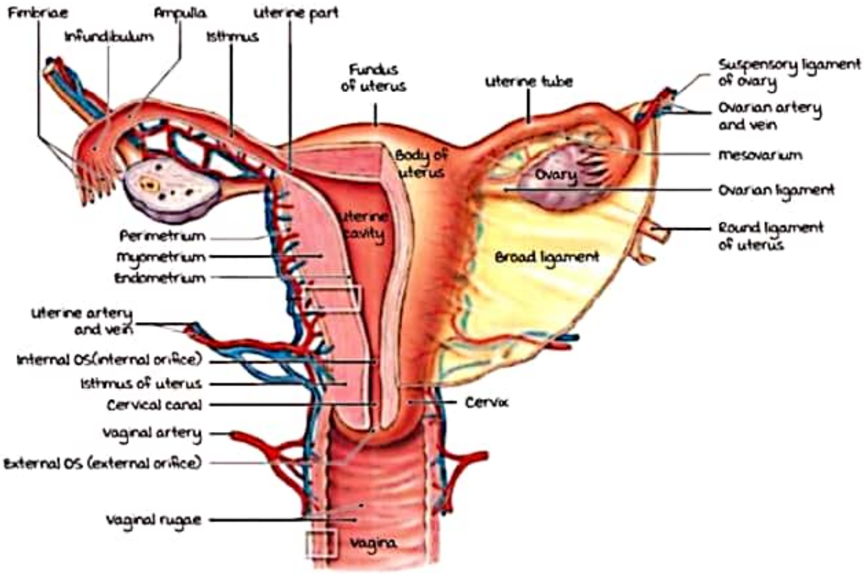
Distal part → Forms round ligament

Ligaments related to ovary 00:18:43

1. Ovarian ligament: connects ovary to cornua of uterus
2. Infundibulopelvic ligament / Suspensory ligament of ovary:
   - Connects ovary to pelvic side walls
   - Ovarian vessels and nerves present
3. Mesovarium: Part of broad ligament anterior to ovary

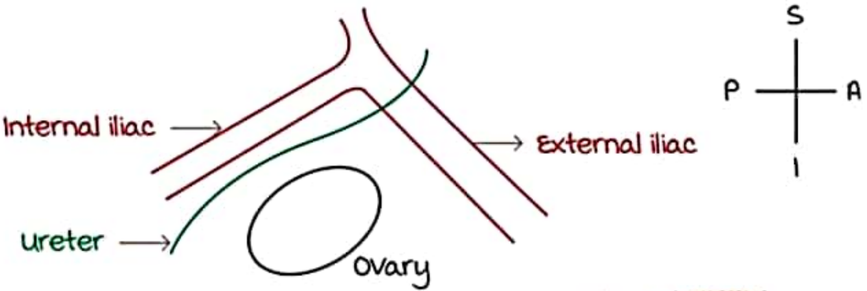
Active space

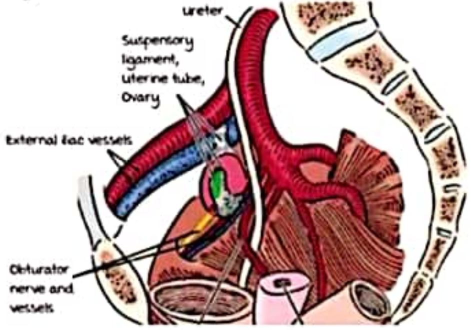
Uterine Tube


Fimbriae
Ampulla
Uterine part
Infundibulum
Isthmus
Fundus of uterus
Uterine tube
Suspensory ligament of ovary
Ovarian artery and vein
Mesovarium
Body of uterus
Ovary
Ovarian ligament
Uterine cavity
Round ligament of uterus
Perimetrium
Myometrium
Endometrium
Broad ligament
Uterine artery and vein
Internal OS(internal orifice)
Isthmus of uterus
Cervical canal
Cervix
Vaginal artery
External OS (external orifice)
Vaginal rugae
Vagina

Relations of ovary

00:26:17


S
P
A
I
Internal iliac
External iliac
Ureter
Ovary


ureter
Suspensory ligament, uterine tube, Ovary
External iliac vessels
Obturator nerve and vessels

Superior / Anterior	External iliac artery
Posterior	Internal iliac artery and ureter
medial	Ovarian ligament
Lateral	Infundibulopelvic ligament obturator nerve

Ovarian tumour → Press obturator nerve

↓

Referred pain to medial side of thigh

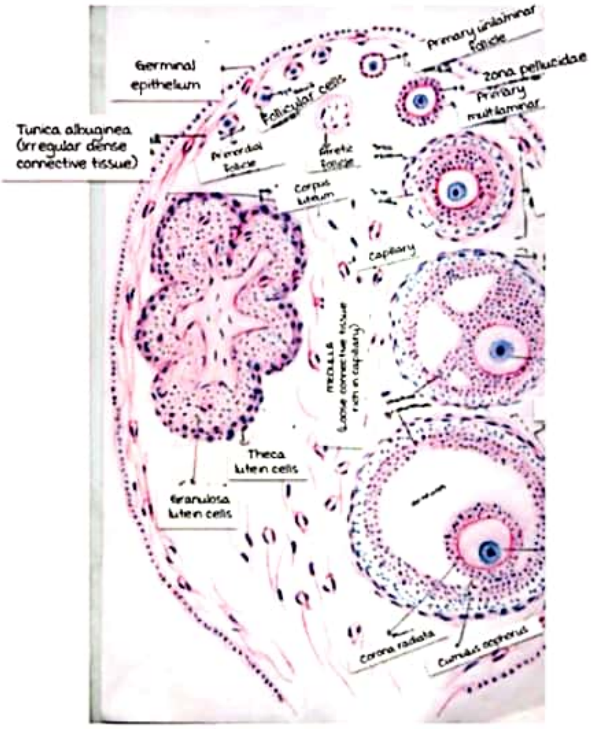
Active space

Histology of ovary:

1. Germinal/surface epithelium
2. Tunica albuginea
3. Cortex
   - Germ cells
   - Follicular / Granulosa cells
4. medulla
   a) myoid like contractile cells
   b) Interstitial cells → Theca cells
   c) Hilus cells → Secrete androgen

K.a stroma

+ Blood vessels and nerves


Germinal epithelium
Primary unilaminar follicle
Zona pellucidae
Primary multilaminar
Follicular cells
Tunica albuginea (irregular dense connective tissue)
Primordial follicle
Atretic follicle
Corpus luteum
Capillary
Medulla (Loose connective tissue rich in capillary)
Theca lutein cells
Granulosa lutein cells
Corona radiata
Cumulus oophorus

Origin of the ovary

00:35:10

Arises from genital ridge

Hormones produced:

- main: E_2 (estradiol)
- E_1 (estrone)
- Androstenedione
- Testosterone
- 17 α – OH – progesterone

Blood supply: ovarian artery (branch of abdominal aorta)

Venous drainage:

Right ovarian vein → Drains into IVC
Left ovarian vein → Drain in left renal vein
↓
Into IVC

Lymphatic drainage : Para-aortic LN
Nerve supply : Ovarian plexus

Active space

ANATOMY OF FEMALE GENITAL TRACT: UTERUS AND CERVIX

Uterus

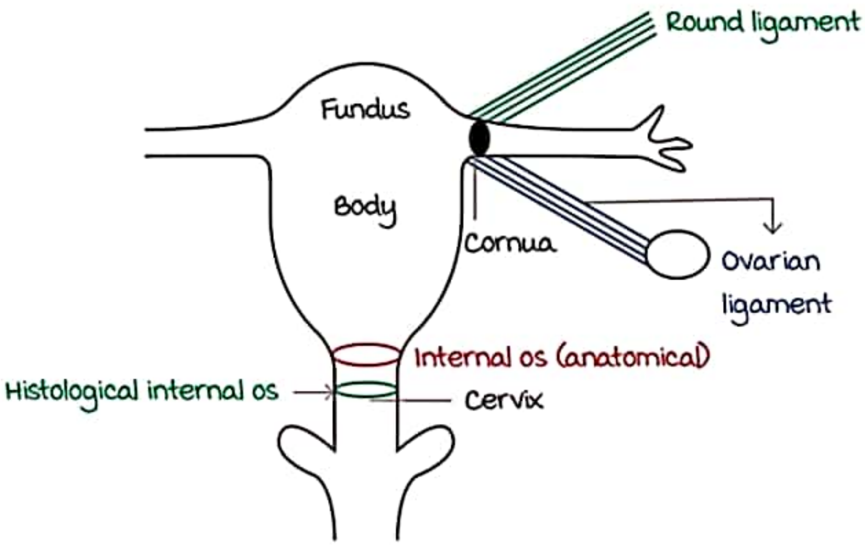
00:00:06

Shape of uterus – pyriform

Parameter	Non-Pregnant		Pregnant
	Nulliparous	multiparous	
Weight	50–70 g	60–80 g	1000 g
Volume	10 ml	10 ml	5 L
Length	6–8 cms	9–10 cms	35 cms

Size of uterus in inches: 3.5 x 2.5 x 1.5 inch

Parts of uterus:


Round ligament
Fundus
Body
Cornua
Ovarian ligament
Internal os (anatomical)
Histological internal os
Cervix

Lining of uterus: ciliated low columnar epithelium

Lining of endocervix: high columnar epithelium

Anatomical internal os : the part where broad uterine cavity converts into a narrow cervical canal

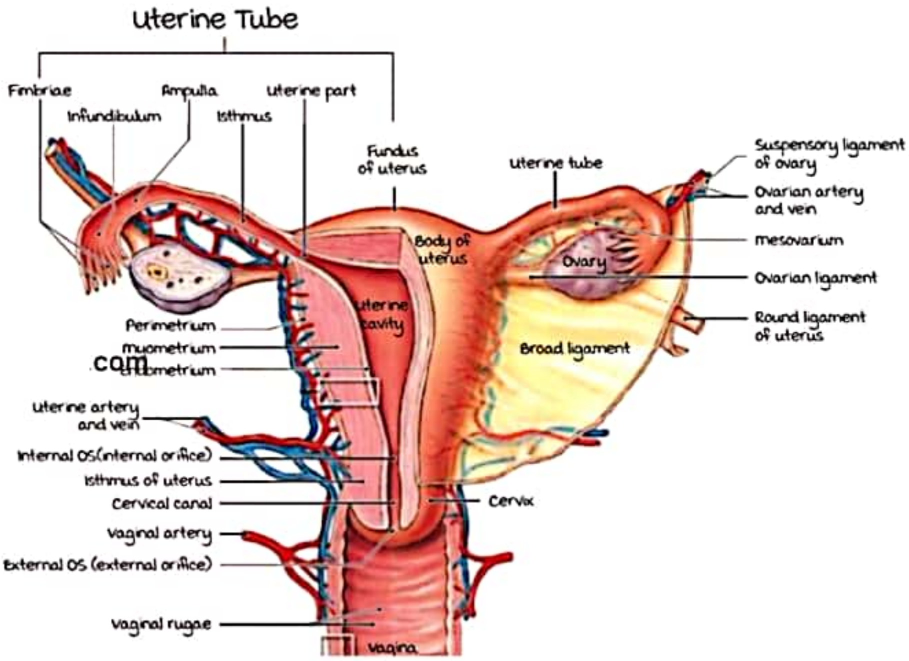
Histological internal os : the part where uterine epithelium converts into cervical epithelium

Isthmus : part of uterus between anatomical and histological internal os

Structures attached to cornua of uterus:

Anterior to posterior: R – Round ligament
T – Fallopian tube
O – Ovarian ligament

From superior to inferior: Fallopian tube, Round and ovarian ligament (at same level)


Uterine Tube
Fimbriae
Ampulla
Uterine part
Infundibulum
Isthmus
Fundus of uterus
Uterine tube
Suspensory ligament of ovary
Ovarian artery and vein
Mesovarium
Body of uterus
Ovary
Ovarian ligament
Uterine cavity
Round ligament of uterus
Perimetrium
Myometrium
Broad ligament
Endometrium
Uterine artery and vein
Internal OS(internal orifice)
Isthmus of uterus
Cervical canal
Cervix
Vaginal artery
External OS (external orifice)
Vaginal rugae
Vagina

most common cause (mcc) of failure of female sterilization → Identification of wrong structure

Isthmus 00:26:30

Lower most part of uterus

Lies between anatomical and histological internal os

0.5 cm in non-pregnant female

5cm in pregnant female → Forms lower uterine segment (LUS)

LUS: Formed late in pregnancy (at term): LUS → 70% Isthmus
30% cervix

Size at term : 5 cms

Length at labor : 10 cms

Identified by loose fold of peritoneum attached to it

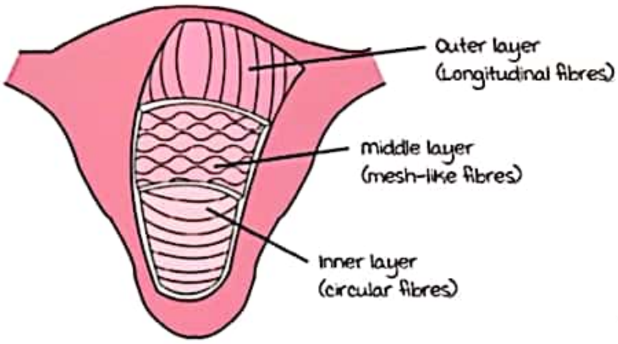
Histology of uterus 00:15:20

3 Layers:

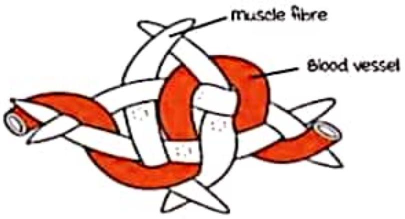
1) serosa – Outermost

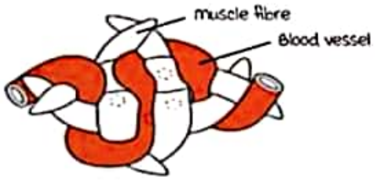
2) myometrium – Thickest (2.5 cms)

- Fibres arranged in three layers


Outer layer (Longitudinal fibres)
middle layer (mesh-like fibres)
Inner layer (circular fibres)

- middle layer: fibres run criss-cross→constrict blood vessels
  ∴ A/K/A living ligature


muscle fibre
Blood vessel


muscle fibre
Blood vessel

3) Endometrium – Inner most layer (glands + stroma present)

Lining: mixed ciliated & non-ciliated columnar epithelium

Layers of endometrium

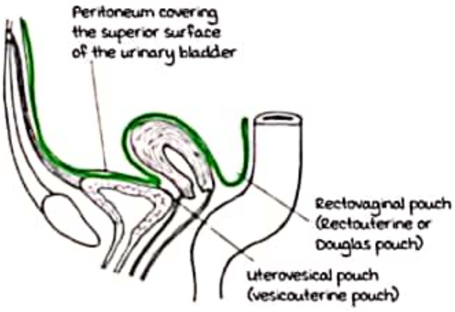
- Superficial layer
  Stratum spongiosum + Stratum compacta
  ↓
  shed off during menstrual cycle
- Deep layer
  stratum basalis
  ↓
  Responsible for regeneration of entire endometrium in the next cycle

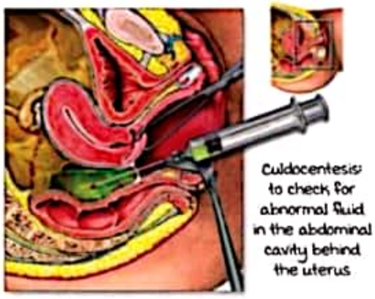
Endometrial thickness:

Immediately after menstruation: 1-2 mm
Early proliferative phase: 5-7 mm
Pre-ovulatory phase – 11 mm
Secretory phase: 7-16 mm
At time of implantation: 11 mm

Peritoneal relation of uterus 00:22:38

Peritoneal covering of the uterus


Peritoneum covering the superior surface of the urinary bladder
Rectovaginal pouch (Rectouterine or Douglas pouch)
Uterovesical pouch (vesicouterine pouch)


Culdocentesis: to check for abnormal fluid in the abdominal cavity behind the uterus

Culdocentesis: To check for abnormal fluid in pouch of Douglas (cul-de-sac)

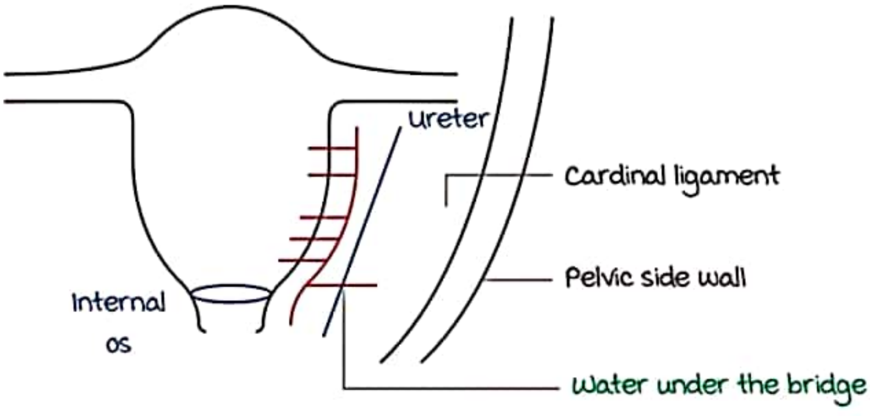
Colpotomy: To drain the pelvic abscess

Blood supply of uterus 00:26:25

1. Uterine artery: branch of anterior division of internal iliac artery
2. Ovarian artery

Uterine artery:

cardinal ligament: also known as (aka) mackenrodt ligament / Transverse cervical ligament


Ureter
Cardinal ligament
Pelvic side wall
Internal os
Water under the bridge

- 2 cm lateral to internal OS → Uterine artery directly crosses over the ureter k.a water under bridge (water- ureter, bridge- uterine artery)

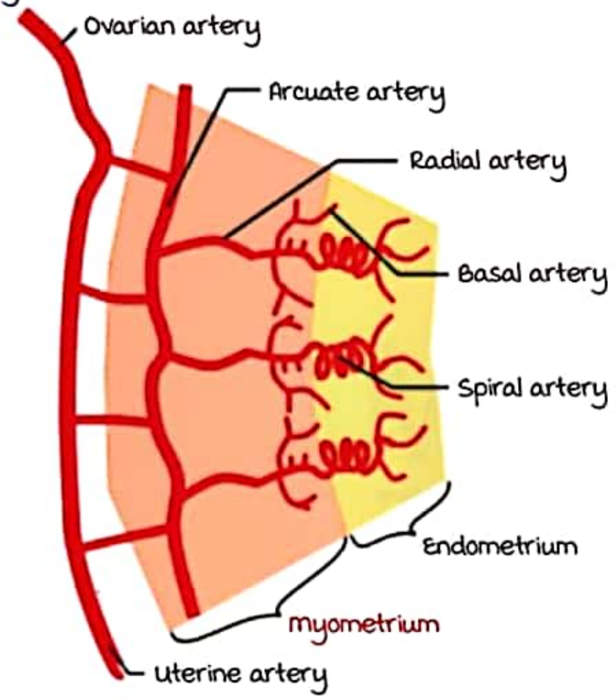
↓

most Common site of ureteric injury during hysterectomy

Branches of uterine artery

- branch (br.) To uterus → From outside to inside
- Descending cervico vaginal artery → Vagina and cervix
- Sampson artery → Round ligament

U – br. Of uterine artery
A – Arcuate artery
R – Radial artery
B – Basal artery


Ovarian artery
Arcuate artery
Radial artery
Basal artery
Spiral artery
Endometrium
myometrium
uterine artery

Uterus - lymphatic drainage, nerve supply, development, position

00:37:25

Lymphatic drainage of uterus:

Fundus → Para aortic nodes
Cornua → Along round ligament to superficial inguinal nodes
Body → External + internal iliac nodes

Nerve supply: $T_{10} - L_1$

Development: from mullerian duct

Position of uterus:

Normal: Anteverted, antiflexed position [fundus towards pubic symphysis]

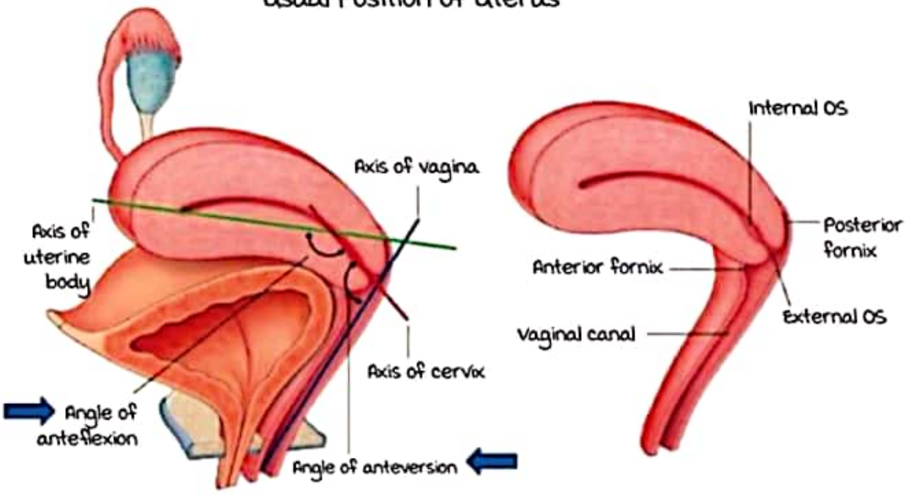
Retroverted uterus → Fundus towards sacral promontory

Angle of anteversion: 90° (between vagina and cervix)

Angle of anteflexion: 120° (between uterus and cervix)

Round ligament: Promotes anteversion & anteflexion
passes via inguinal canal and attaches at
anterior $1/3^{rd}$ of labia majora

Usual Position of Uterus


Axis of vagina
Axis of uterine body
Axis of cervix
Angle of anteflexion
Angle of anteversion
Internal OS
Posterior fornix
Anterior fornix
External OS
Vaginal canal

Anteverted Anteflexed Uterus

Cervix

00:43:47

Endocervix or
supravaginal cervix
- 1.25 cm

Columnar epithelium

Exocervix
or Portio vaginalis
- 1.25 cm

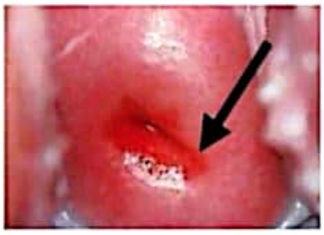
Stratified squamous
epithelium

External OS: Cervix opens into vagina
In nulliparous → Circular / Pinpoint
In multiparous → Transverse / Slit like

Length of cervix: Non-pregnant → 2.5 cms
Pregnant → 4-5 cms

Transformation zone (TZ): Squamo – columnar junction

- On per speculum examination:
  Endocervix: Appears red
  Exocervix: Appears pink
  Transformation zone: pale area between the two



- TZ originally located → At external OS
- Dynamic point → Keeps shifting under the influence of hormones

moves out/Towards Exocervix
1) Puberty
2) Pills
3) Pregnancy

moves in/towards endocervix
- menopause (less hormonal state)

m.c variety of Ca cervix: squamous cell Ca

m.c site: Transformation zone

m.c site for adeno Ca of cervix: Endocervix

Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Blood supply of cervix 00:55:30

- Descending cervico – vaginal artery
- Placed at 3'O clock and 9'O clock position
- Para cervical block → At 2 and 10'o clock position
  Or 4 and 8'o clock position

Lymphatic drainage of cervix:
  Hypogastric / Internal iliac nodes
  Obturator nodes
  Pre-sacral / ureteric nodes
  External iliac nodes

m.c node in cancer (ca) cervix → Obturator LN

Sentinal nodes for Ca cervix → ureteric nodes

Superficial inguinal nodes → Not involved in Ca Cervix
  If involved → Indicated metastasis (stage IV)

Nerve supply: S_2–S_4 segments

Development: Mullerian duct

Before Puberty → Cervix is longer than uterus

	Cervix : Corpus ratio
At birth	1 : 1
Before puberty	2 : 1
At puberty	1 : 2
Reproductive age	1 : 3
menopause	1 : 1 (both atrophy)

MULLERIAN MALFORMATIONS

Mulllerian duct 00:00:23

- Forms the internal genital organs
- Appears at 6 weeks of gestation
- Originate from intermediate mesoderm
- Left mullerian duct forms –
  - Left side fallopian tube
  - Left half of uterus
  - Left half of cervix
  - Left half of upper 2/3 vagina
- The right mullerian duct forms the same components on the right side

Formation

Steps – 1 – Both grow towards each other in midline

Step – 2 – Fusion of both mullerian duct

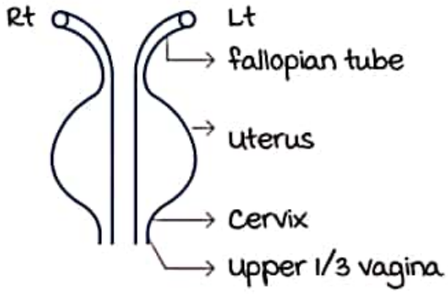
- Begins by 7-8 weeks
- Completes by 12 weeks
- Fusion occurs in below upwards direction

Step – 3 – Fusion complete and septa formed

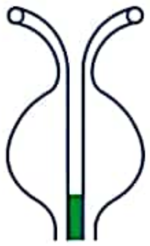
Step – 4 – Septa resolves by 5th month of intrauterine life
single uterine cavity is formed

Step – 5 – Fundus of uterus becomes dome shaped

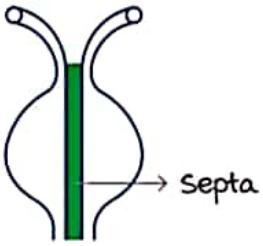
Step-1


Rt
Lt
fallopian tube
uterus
Cervix
upper 1/3 vagina

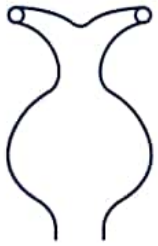
Step-2



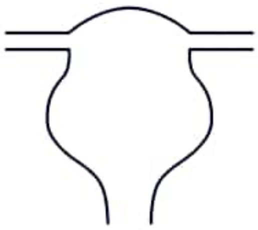
Step-3



Step-4



Step-5



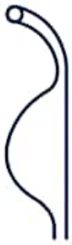
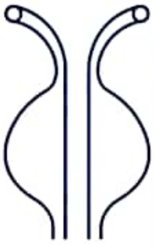
Mullerian malformations - mullerian agenesis

00:07:34

	Condition	Known as	Diagram	
1	Both mullerian Duct (MD) absent	mullerian agenesis or MRKH syndrome		• Both fallopian tube absent • uterus, cervix and upper vagina – absent • Lower vagina present – (develop from sinovaginal bulb) • Ovaries – present • Ovulation – normal

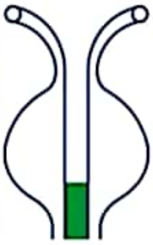
Mullerian malformations-unicornuate and didelphic uterus

00:11:26

	Condition	Known as	Diagram	
2.	mullerian duct absent on one side	Unicornuate uterus		• One fallopian tube present • Half uterus, cervix, upper vagina present
3.	Both side mullerian duct present but fail to fuse	Didelphic uterus		• Two fallopian tube, Two cervix, Two uterus, Two upper vagina Present

Mullerian malformation- bicornuate uterus

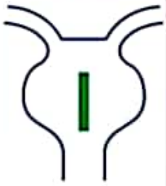
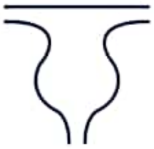
00:15:00

	Condition	called as	Diagram	
4.	If both MD are present, incomplete fusion	Bicornuate uterus Single cervix ↓ Unicollis Two cervix ↓ Bicollis		• Two fallopian tube • Two uterus • One vagina present

Active space

Mullerian malformation - septate uterus and arcuate uterus

00:19:18

	Condition	Known as	Diagram	
5.	Both MD are present ↓ Fusion occurs ↓ Septa formed ↓ Septa fails to resolve	Septate uterus		• Uterus appears Normal from outside ↓ septa present inside
6.	Fundus of uterus does not become dome shaped	Arcuate uterus		• Uterus is flat on top • Best reproductive prognosis
7.	DES (Diethylstil-bestrol) related abnormalities	T-shaped uterus		

WHO classification of mullerian duct anomalies

Class I	mullerian agenesis (MRKH syndrome)
Class II	Unicornuate uterus
Class III	Didelphys uterus
Class IV	Bicornuate uterus
Class V	Septate uterus
Class VI	Arcuate uterus
Class VII	DES related abnormalities/T shaped uterus

Diethyl stilbesterol related abnormalities 00:24:52

- Pregnant woman exposed to DES
  ↓
  causes two types of cancer in female foetus
  - Vaginal clear cell carcinoma
  - Adenocarcinoma of cervix

- Effects of DES in female child
  - Uterus
    ↓
    - M.C – Hypoplastic uterus
    - Characteristic finding } T-Shaped uterus
  - Cervix
    ↓
    - Cervix hood
    - Cervix collar
    - Cervical intraepithelial neoplasia
  - Vagina
    ↓
    - Vaginal adenosis

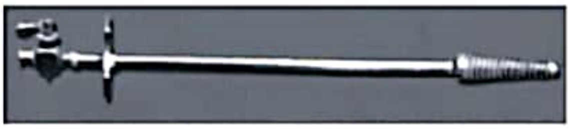
- No Renal anomalies in female chilld

- DES effect in male
  - Hypospadias
  - Cryptorchidism
  - Testicular hypoplasia
  - Can lead to Renal anomalies

Diagnosis of Mullerian malformations 00:28:24

- Hysterosalpingography (HSG)

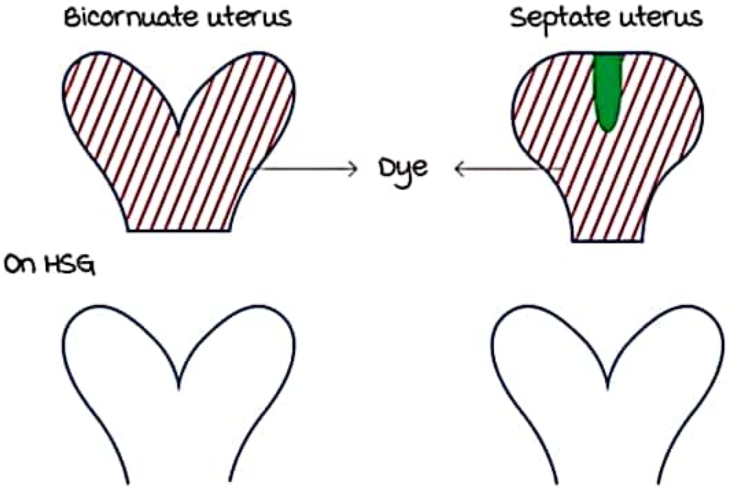
  Radio opaque dye is injected into uterus and cervix using Leech Wilkinson Cannula
  ↓
  serial X-rays used to check for flow of dye



- Time for doing HSG – Day 7 – day 10 (pre-ovulatory phase)
- Contraindications – Pregnancy
  - Pelvic inflammatory disease (PID)
  - Genital TB
  - Allergic to dye
- Indications
  - i) IOC – for Tubal patency
  - ii) mullerian malformations
  - iii) Fibroid / Asherman syndrome (Honeycomb appearance on HSG)

Investigation of choice for mullerian malformation 00:35:37

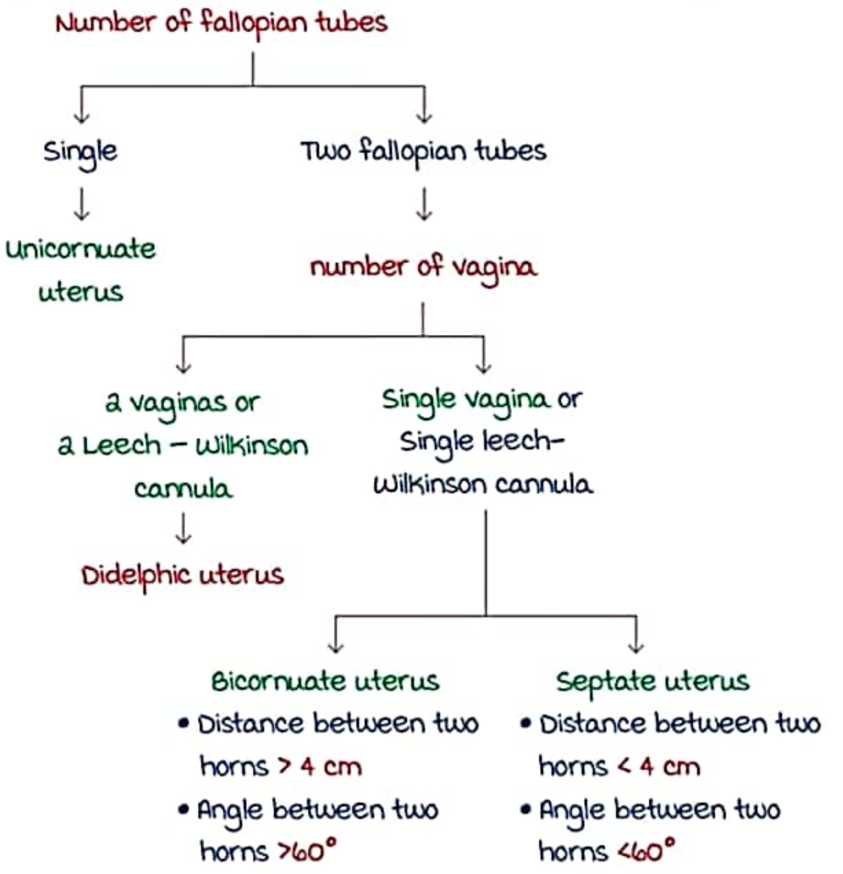
On HSG – Bicornuate and septate uterus cannot be differentiated



- Both uterus appears same on HSG
- IOC – MRI > 3D ultrasound
- Gold standard investigation
  - Laparoscopy + Hysteroscopy
  - 2nd best – Laparoscopy

Identification of mullerian malformations on HSG

00: 41: 01



Number of fallopian tubes

Single → Unicornuate uterus

Two fallopian tubes → number of vagina

2 vaginas or 2 Leech – Wilkinson cannula → Didelphic uterus

Single vagina or Single leech-Wilkinson cannula

Bicornuate uterus
- Distance between two horns > 4 cm
- Angle between two horns >60°

Septate uterus
- Distance between two horns < 4 cm
- Angle between two horns <60°

Important points and management of mullerian malformation

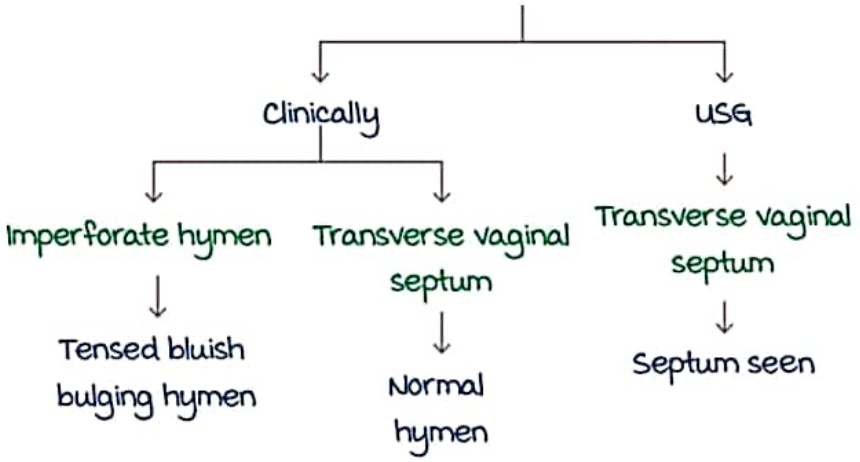
00:51:24

- m.c mullerian malformation – Septate uterus > Bicornuate uterus
- m.c problem with mullerian malformation – Recurrent abortions
- m.c mullerian malformation associated with recurrent abortion, infertility – Septate uterus
- Reproductive outcome is best with – Arcuate uterus > didelphic uterus
- Worst reproductive prognosis – unicornuate uterus
- m.c mullerian malformation most likely to be associated with renal anomalies – Mullerian agenesis or unicornuate uterus

Active space

management

- ≥ 3 abortions due to malformations – surgery


Clinically
USG
Imperforate hymen
Tensed bluish bulging hymen
Transverse vaginal septum
Normal hymen
Transverse vaginal septum
Septum seen

Development of vagina

00:57:28

- upper ⅔ vagina – develops from mullerian duct (mesodermal in origin)
- Lower ⅓ vagina – develops from urogenital sinus (Endodermal in origin)
- Both the parts fuse – septum is formed

↓

Recanalization of septum occurs

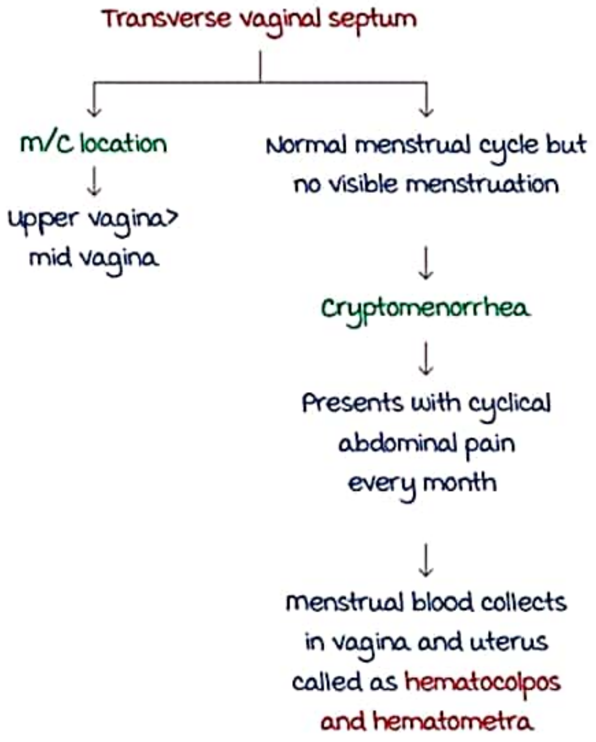
↓

Single vagina formed

Transverse vaginal septa

01:00:35

- recanalization of septum does not occur



Transverse vaginal septum

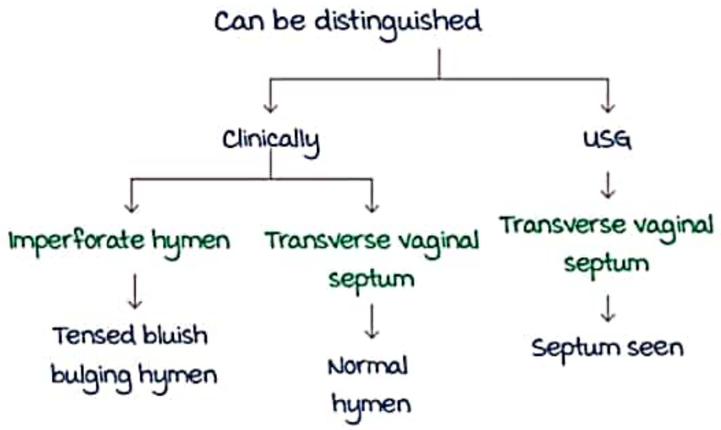
m/c location → upper vagina> mid vagina

Normal menstrual cycle but no visible menstruation → Cryptomenorrhea → Presents with cyclical abdominal pain every month → menstrual blood collects in vagina and uterus called as hematocolpos and hematometra

- Cryptomenorrhea – caused by Transverse vaginal septum, Imperforate hymen
- m.c.c of hematometra – Imperforate hymen
- Per abdomen – bulky uterus
- Per vagina – contraindicated in virgin females

Difference between imperforate hymen and transverse vaginal septum

01:06:00

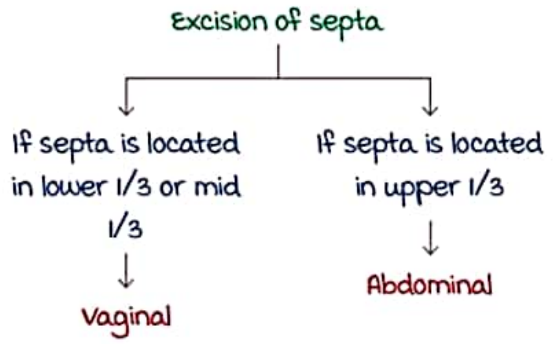


Can be distinguished

Clinically → Imperforate hymen → Tensed bluish bulging hymen

Clinically → Transverse vaginal septum → Normal hymen

USG → Transverse vaginal septum → Septum seen management of transverse vaginal septa


Excision of septa
If septa is located in lower 1/3 or mid 1/3
Vaginal
If septa is located in upper 1/3
Abdominal

- Vaginal epithelium is derived from – Endoderm of urogenital sinus
- muscles of vagina are derived from – mesoderm of Mullerian duct
- Hymen – Remnant of sinovaginal bulb

Active space

UTERINE PROLAPSE

Prolapse 00:00:07

Definition : 'Downward displacement of uterus, cervix or vagina from its normal anatomical position'

- Structures preventing prolapse of uterus / vagina

↓

Supports of uterus / vagina

Prolapse

↓ Uterocervical prolapse ↓ Prolapse of uterus and cervix

↓ Vaginal prolapse

Supports of uterus

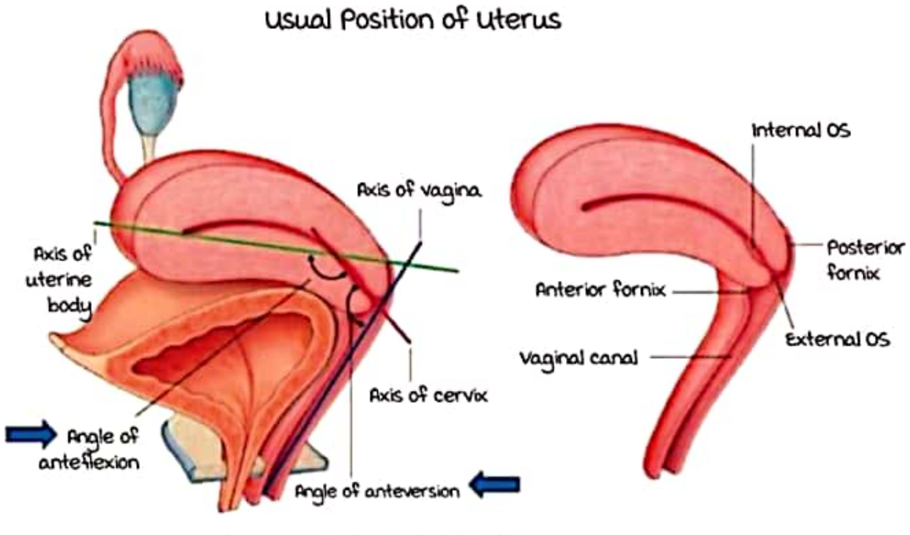
↓ Mechanical factors

↓ Ligaments

↓ Muscle

Mechanical factors supporting uterus 00:02:07

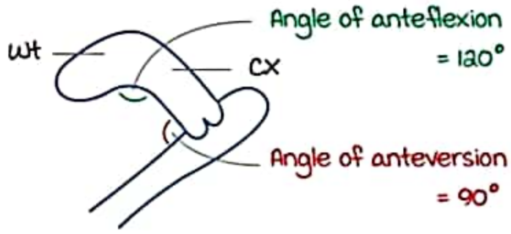
Usual Position of Uterus


Axis of vagina
Axis of uterine body
Axis of cervix
Angle of anteflexion
Angle of anteversion
Internal OS
Posterior fornix
Anterior fornix
External OS
Vaginal canal

Anteverted Anteflexed Uterus

1) Angle of anteversion
↓
Angle between
vagina
and cervix
↓
90°

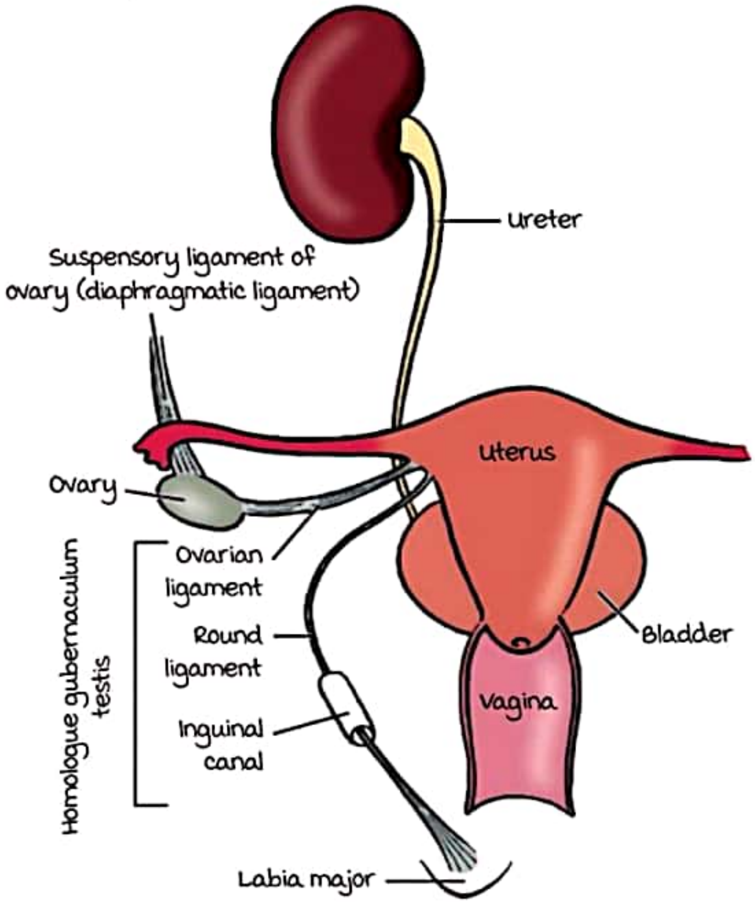
mechanical supports


ut
cx
Angle of anteflexion
= 120°
Angle of anteversion
= 90°

2) Angle of anteflexion
↓
Angle between cervix and uterus
↓
120°

- 1st step in prolapse
↓
" Retroversion of uterus "

Round ligament


Ureter
Suspensory ligament of
ovary (diaphragmatic ligament)
Uterus
Ovary
Ovarian
ligament
Round
ligament
Inguinal
canal
Homologue gubernaculum
testis
Bladder
Vagina
Labia major

Round ligament

Origin cornua of uterus passes through : Inguinal canal

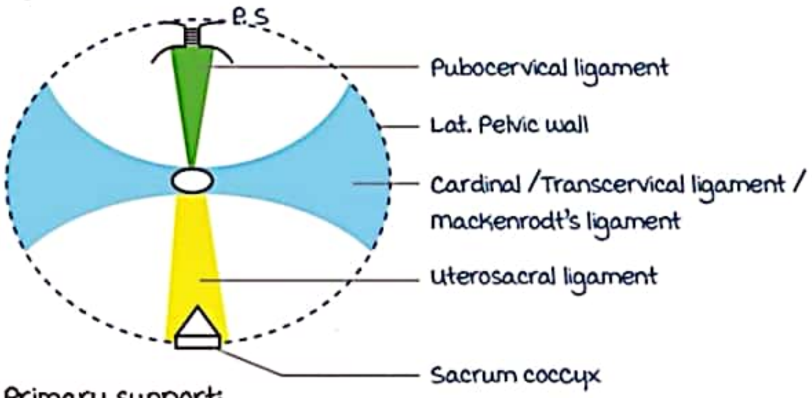
Insertion: Labia majora

→ Keeps uterus in anteverted position
↓
'Secondary Support'

Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Ligaments supporting uterus 00:07:53

Ligaments with support uterus


P.S
Pubocervical ligament
Lat. Pelvic wall
Cardinal /Transcervical ligament / mackenrodt's ligament
Uterosacral ligament
Sacrum coccyx

Primary support:

1) Pubocervical ligament
2) Transcervical or cardinal or mackenrodt's ligament (most important)

} Triradiate ligament

3) Uterosacral ligament

- Broad ligament does not support uterus.
- Prevention of retroversion of uterus →
  1) Uterosacral ligament (best)
  2) Round ligament (2nd best)

Muscle supporting uterus 00:14:37

- Levator ani muscle (most important support)

Divides into
↓ Pubococcygeal
↓ Iliococcygeal

- Forms pelvic diaphragm

Active space

- Urogenital diaphragm
  - ↓ Superficial fascia of urogenital diaphragm
  - ↓ Inferior fascia of urogenital diaphragm
    - ↓ Perineal membrane

- Contains: Deep transverse perineal muscle

- Superficial perineal pouch

Contents:

- 1) Bulbospongiosus muscle
- 2) Superficial transverse perineal muscle
- 3) Ischiocavernosus muscle

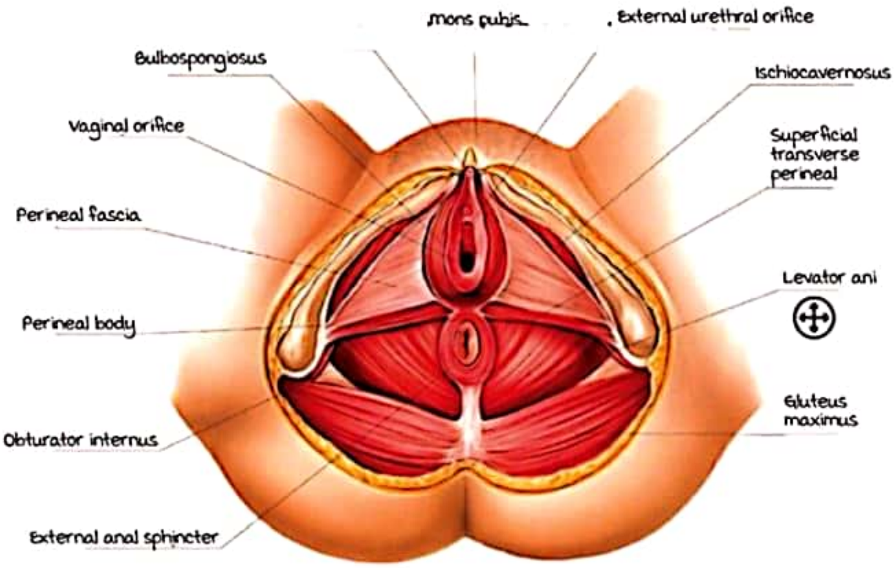
- Midline muscles attach to

↓

Perineal body

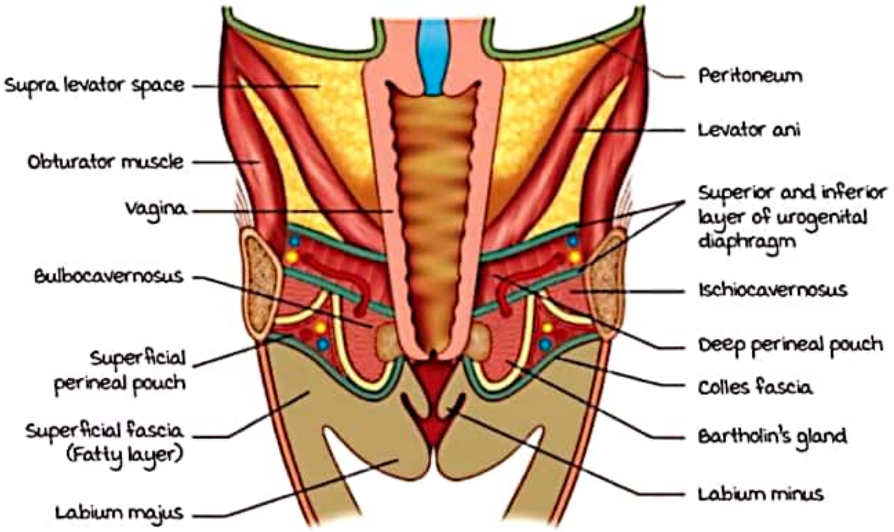
↓

Supports uterus, vagina and cervix


Mons pubis
External urethral orifice
Bulbospongiosus
Ischiocavernosus
Vaginal orifice
Superficial transverse perineal
Perineal fascia
Levator ani
Perineal body
Gluteus maximus
Obturator internus
External anal sphincter

Active space

muscles supporting uterus


Supra levator space
Obturator muscle
Vagina
Bulbocavernosus
Superficial perineal pouch
Superficial fascia (Fatty layer)
Labium majus
Peritoneum
Levator ani
Superior and inferior layer of urogenital diaphragm
Ischiocavernosus
Deep perineal pouch
Colles fascia
Bartholin's gland
Labium minus

mnemonic: BLESSD

B → Bulbospongiosus muscle

L → Levator ani muscle (most important)

E → External anal sphincter

S → Superficial transverse perineal muscle

S → External urethral sphincter muscle

D → Deep transverse perineal muscle

→ muscles which does not support uterus
↓
1) Ischiocavernosus
2) Ischiococcygeus

Uterine prolapse

00:25:58

- Due to weak uterine supporting system

Risk factors:

1) menopause
↓
- Atonicity of uterus } weakens support of uterus
- Asthenia of uterus }

2) Repeated child birth / Birth trauma
- mc in elderly, multiparous
- Rarely in young, nulliparous

Active space

Congenital prolapse

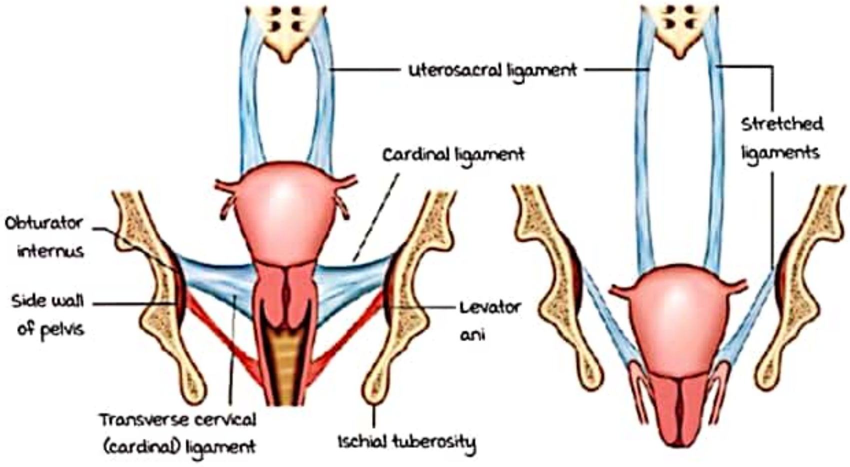
00:28:29

- uterine prolapse in young nulliparous female
- Risk factors:
  1) Ehler Danlos syndrome
  2) Spina bifida
  3) Osteogenesis imperfecta
  - cystocele not seen
- management:
  "SLING Surgery"/ "Cervicopexy"

Symptoms of prolapse:

1) Back ache
↓
Due to stretching of
Uterosacral ligament

Stretching of uterosacrals


Uterosacral ligament
Stretched ligaments
Cardinal ligament
Obturator internus
Side wall of pelvis
Levator ani
Transverse cervical (cardinal) ligament
Ischial tuberosity

2) Decubitus ulcer
- Due to: Venous congestion
- Not due to : Friction between thighs

Management:

Packing with: Acriflavine + Glycerine
↓ Antiseptic
↓ Hygroscopic

Active space

Complication and management of prolapse

00:35:33

Complications:

1) UTI

2) Kinking of ureter (procidentia)

Can cause

↓ Hydroureter

↓ Hydronephrosis

3) Incarceration of prolapsed part

4) Cause cancer (rarely)

management of prolapsed

depends on

↓ Age of patient

↓ Parity

Sling surgery / cervicopexy

00:38:36

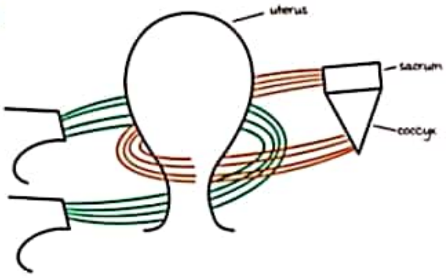
Indication:

1) Congenital prolapse (young, nulliparous female with prolapse)

2) Young female with prolapse

↓

planning to conceive in future



- Sling used: " mersilene tape "

Sling surgery

↓ Anterior sling surgery

↓ Posterior sling surgery

↓

Shirodkar surgery

- Anterior sling surgery

Purandare sling surgery

↓

- One end of sling attached to

↓

- Isthmus of uterus

↓

- Other end of sling attached to Rectus fascia
- Example: Dynamic sling

↓

- Female should have good abdominal tone
- Complications → Less
- Success rate → Less

Khanna sling surgery

↓

- One end of sling attached to

↓

Isthmus of uterus

- Other end of sling to

↓

Anterior superior iliac Spine

- Complication : Osteitis
- No longer used

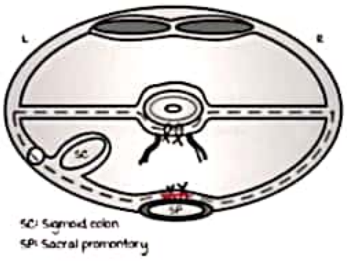
Shirodkar sling surgery 00:44:11

- Attachments
  - one end – Isthmus of uterus
  - other end – ligament attached to sacral promontory
- Example of

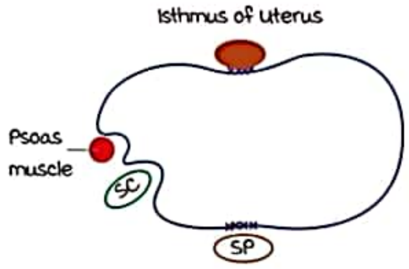
Posterior sling   Static sling

- Recreates / Strengthens: Uterosacral ligament

Shirodkar sling surgery



SC: Sigmoid colon
SP: Sacral promontory



Complications of Shirodkar's sling 00:49:40

Left side
↓
① Obstruction of sigmoid colon
② Injury to mesenteric vessels
③ Uretric injury
④ Genito femoral nerve injury
↓
"Success rate of shirodkar's surgery – more"

Right side
↓
No complication

Composite sling surgery:

- Aka " Virkud sling surgery "

Right side
↓
Shirodkar sling surgery

Left side
↓
Purandare's sling surgery

Fothergills repair /manchester surgery 00:51:36

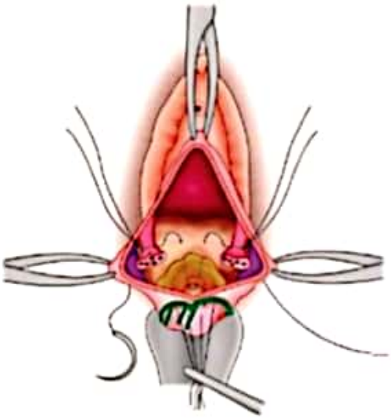
Indication:

- Female with prolapse < 40 years of age
- Do not want to conceive in future
- Wants to retain menstrual cycles

Steps:

1) Amputation of cervix (Supravaginal)

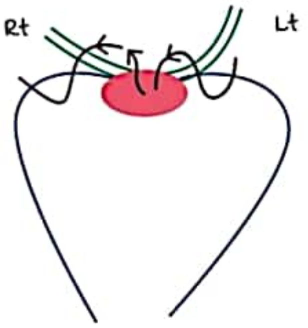
- Complications:
- Internal OS injury
  ↓
  Recurrent 2nd trimester abortions
- Cervical stenosis
- Cervical dystocia
- Posterior lip of cervix
  ↓
  Covered by vaginal flap
  ↓
  Sturmdorf suture



Active space

a) Plication of cardinal ligament

- Fothergill's suture pasess from left vaginal skin
  ↓
  Through left cardinal ligament
  ↓
  Into cervix



Fothergill's suture

- From cervical tissue
  ↓
  Suture is taken up and out of cervix
  ↓
  Through right cardinal ligament
  ↓
  Into right side of vagina

- In Shirodkar modification of Fothergill repair
  ↓
  Amputation of cervix not done (plication of cardinal ligament done)
  ↓
  Female who wants to bear a child

Ward mayo vaginal hysterectomy ,ring pessary and Lefort's colpocleisis

01:02:37

Ward mayo vaginal Hysterectomy

Indications

- Female with prolapse ≥ 40 years of age
- Does not want to retain menstrual cycle
- Does not want future childbirth

Ring pessary

Indications:

- Young female who refuse surgery
- Prolapse occurs during pregnancy /puerperium
- Contraindicated for surgery

  Ring pessary → Space occupying device at ischial spine
- Temporary cure
  ↓
  Changed every 3 months
  ↓
  Complication: Vesico – vaginal fistula (VVF)

Lefort's colpocleisis:

Indication:

- Female ≥ 65 years age contraindicated for surgery
- Procedure – Scraping of Anterior /posterior vaginal wall
- Done under LA

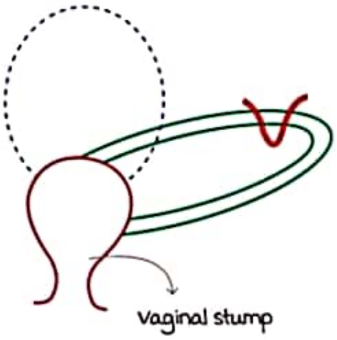
Complications:

Adhesions
↓
Close vaginal wall permanently

Vault prolapse

01:11:04

- Prolapse of vaginal stump which is left post hysterectomy



management:

"Vault suspension surgery"

Abdominal route → Sacral colpopexy (Uterosacral suspension) Gold standard method

Vaginal route → Sacrospinous fixation

- Colposuspension surgery
  ↓
  For 'stress urinary incontinence' (not a surgery for vault prolapse)
  ↓
  management:

Transobturator tape (TOP) > Transvaginal tape (TVP) > Burch colposuspension

Kegel / Perineal exercises:

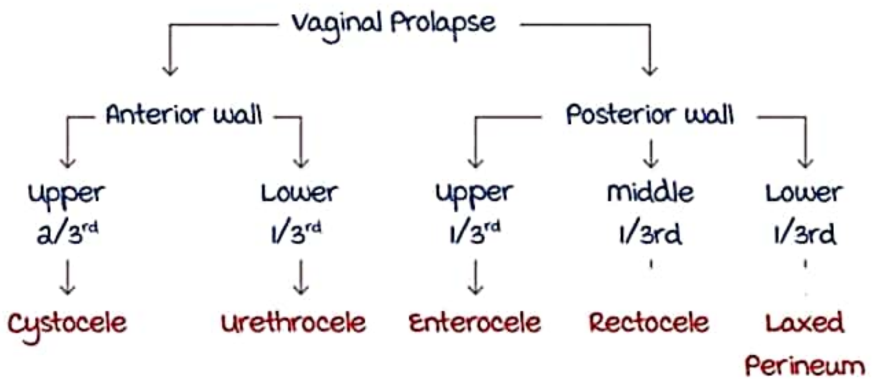
- Best method to prevent prolapse
- Strengthen perineal muscles
- Done 10 times /day
- Adviced:
  - During pregnancy
  - After child birth

Classification of uterine prolapse

01:16:43

Classification	Reference point
1) SHAW classification	Introitus
2) POP-Q classification	Hymen
3) Baden walker Halfway classification	Hymen

VAGINAL PROLAPSE

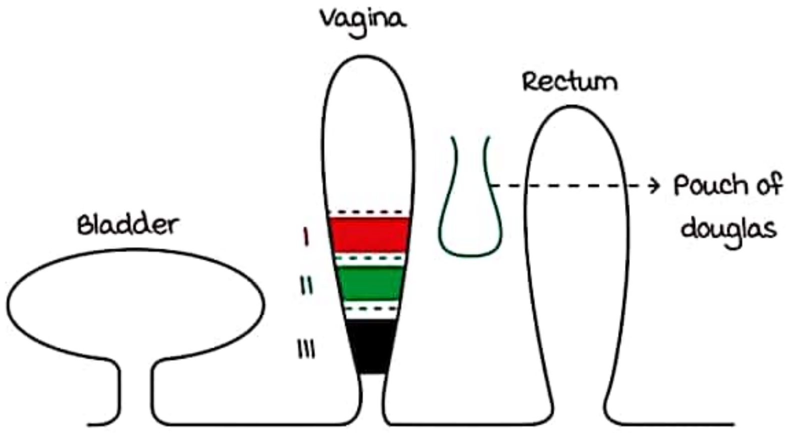

Vaginal Prolapse
Anterior wall
Posterior wall
upper 2/3rd
Lower 1/3rd
upper 1/3rd
middle 1/3rd
Lower 1/3rd
Cystocele
urethrocele
Enterocele
Rectocele
Laxed Perineum

Management of Vaginal Prolapse:

00:03:15

- Not dependent on age / parity
- Cystocele } Anterior Colporrhaphy
- urethrocele }
- Enterocele – moschcowitz repair
  Halban repair
  mcCall Culdoplasty
- Rectocele } Posterior Colporrhaphy
- Laxed Perineum }

De Lancey's Level of Supports:


Vagina
Rectum
Pouch of douglas
Bladder
I
II
III

- Level I : Related to Pouch of Douglas
- Level II : Related to Bladder
- Level III : Related to urethra

Level	Part of vagina	Structural supports	Defect
I	upper ⅓rd of vagina	• Cardinal ligament • uterosacral ligament	• Apical prolapse • Cervical Elongation • Enterocele • Vault prolapsed
II	middle ⅓rd of vagina	• Arcus tendineus fascia	• Cystocele • Rectocele
III	Lower ⅓rd of vagina	• Perineal body & • muscles attached to it	• urethrocele • Laxed Perineum

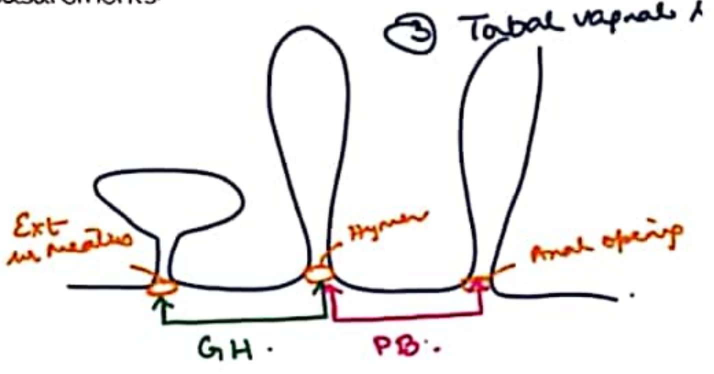
Pelvic Organ Prolapse Quantification System classification 00:12:08

Reference point : Hymen

Anterior wall of vagina	Posterior wall of vagina
Aa – Lies 3cm above the hymen on the anterior wall of vagina	Ap – lies 3 cm above Hymen on the posterior wall of vagina
Ba – Point which is the most dependent part of the anterior vaginal wall between Aa and Anterior fornix	Bp – Point which is the most dependent part of the posterior vaginal wall between Ap and posterior fornix
C – Anterior fornix	D – Posterior fornix

- Above Hymen – Indicated with "–" sign
- Below Hymen – Indicated with "+"

3 measurements:



1. Genital Hiatus (GH)
2. Perineal body (PB)
3. Total vaginal length

Aa	Ba	C
GH	PB	TVL
AP	BP	D

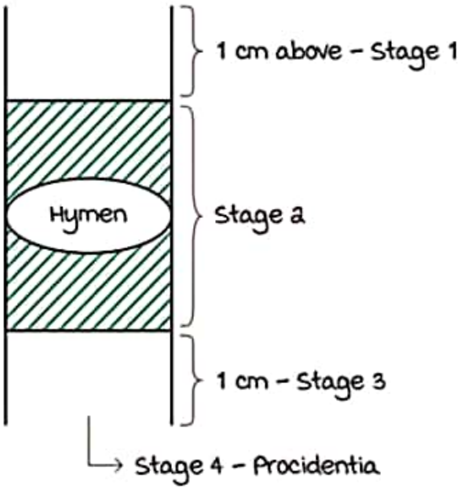
Staging of vaginal prolapse

00:21:56

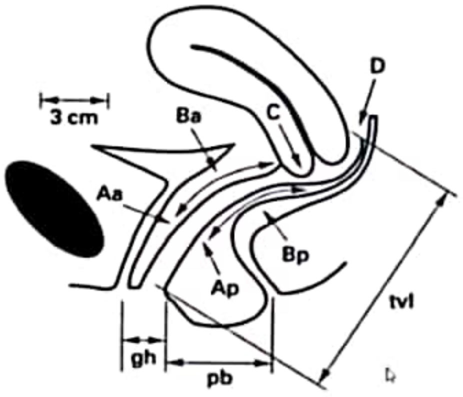
Stage 1 : If the leading point of prolapse is > 1cm above the hymen

Stage 3 : If the leading part of prolapse is > 1 cm below the hymen

Stage 2 : If the leading part of the prolapse is within 1cm on either side of the hymen


1 cm above – Stage 1
Hymen
Stage 2
1 cm – Stage 3
Stage 4 – Procidentia

Stage 4 : Complete Prolapse / Procidentia

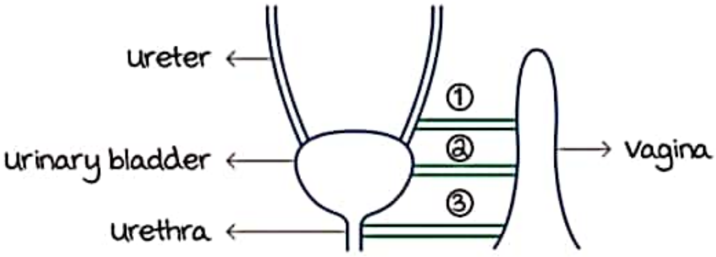

3 cm
Ba
C
D
Aa
Bp
Ap
tvl
gh
pb

URINARY FISTULA

Types of urinary fistulae

00:00:18

1) ureterovaginal fistula
2) vesicovaginal fistula – mc
3) urethero vaginal fistula



Ureterovaginal fistula and vesicovaginal fistula(VVF)

Complain	Fistula
1. Constant dribbling of urine from vagina + Normal urination	ureterovaginal fistula
2. Constant dribbling of urine from vagina + No Normal urination	VVF

Uretherovaginal fistula

- Complaint
  - No constant dribbling of urine from vagina
  - At the time of urination- urine from vagina & urethra
- Fistula
  - Uretherovaginal fistula

Active space

Methylene blue three swab test

00:06:34

- Three cotton plugs – Placed in vagina

Uppermost → Corresponds to → Ureterovaginal fistula

Middle → Corresponds to → VVF

Lower → Corresponds to → Uretherovaginal fistula

- With the help of foleys catheter
  ↓
  Put methylene blue dye in bladder + urethra, wait

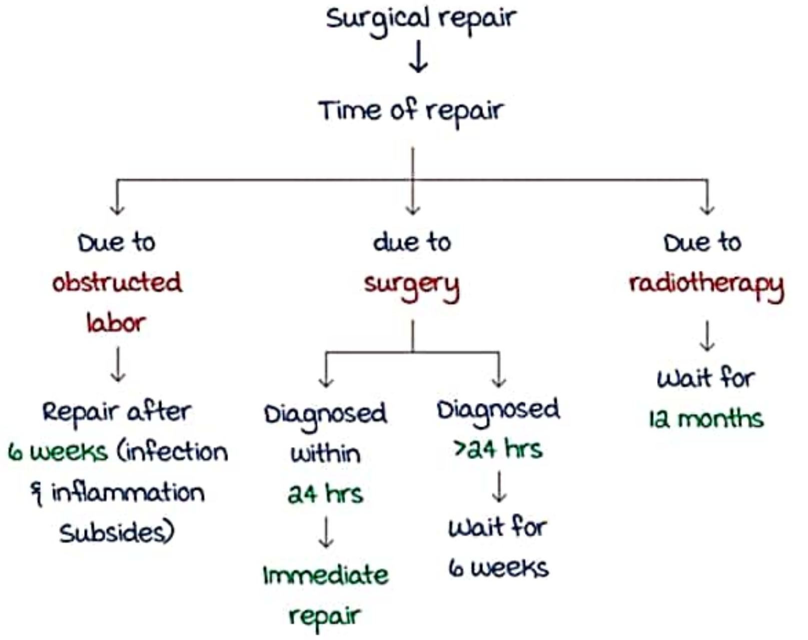
Observation	interpretation
• If the uppermost cotton swab wet with urine but not blue in colour	Ureterovaginal fistula
• If middle cotton swab (or middle + Lower) is wet + blue in colour	VVF
• If only Lower cotton swab is wet + blue	Urethrovaginal fistula

Vesicovaginal fistula

00:12:56

- M.C – Urinary fistula
- M.C.C – In developed countries – Surgery (Hysterectomy)
  Developing countries – Obstructed labor
- I.O.C – Cystoscopy
- Best method to collect urine in VVF patient – Suprapubic catheterisation

management of VVF



Surgical repair ↓ Time of repair

- Due to obstructed labor → Repair after 6 weeks (infection & inflammation subsides)
- due to surgery
  - Diagnosed within 24 hrs → Immediate repair
  - Diagnosed >24 hrs → Wait for 6 weeks
- Due to radiotherapy → Wait for 12 months

ureteric fistulas

- m.c – Site of injury – 2 cms lateral to internal os – Water under bridge
- 2nd m.c – Site – Pelvic brim
- Highest risk of ureteric injury – Wertheim's hysterectomy
- m.c.c of ureteric injury – Simple hysterectomy / Total abdominal hysterectomy
- m.c route of surgery in which ureteric injury is common – Laparoscopic hysterectomy

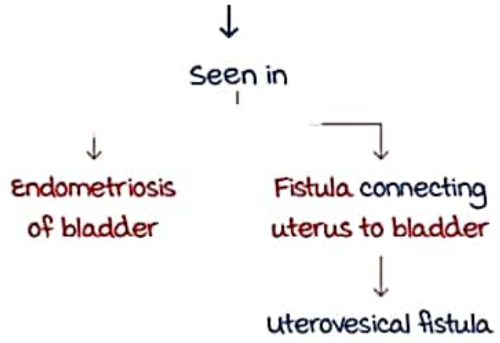
Management of ureteric fistula

00:22:23

- Time of repair – Immediately as soon as diagnosed
- Technique – Boari flap technique

mensouria or menouria

- Hematuria at the time of menstruation



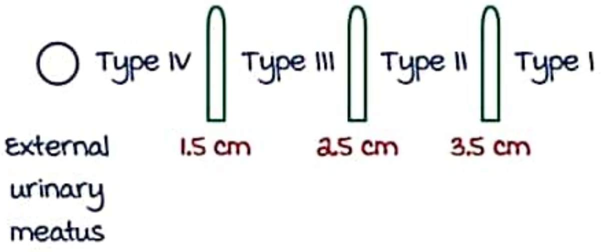
↓ Seen in

- Endometriosis of bladder
- Fistula connecting uterus to bladder → Uterovesical fistula

New classification of genitourinary fistulae

00:25:10

- Depending on distance of fistula from external urinary meatus


Type IV
Type III
Type II
Type I
External urinary meatus
1.5 cm
2.5 cm
3.5 cm

If the distance of fistula from external urinary meatus is

- <1.5 cm ↓ Type IV fistula
- 1.5 cm – 2.5 cm ↓ Type III fistula
- 2.5 cm – 3.5cm ↓ Type II fistula
- >3.5cm ↓ Type I fistula

a) < 1.5 cms in diameter

b) 1.5 to 3 cms in diameter

c)>3 cms in diameter.

PELVIC INFLAMMATORY DISEASE (PID)

Definition

- Infection of upper female genital tract which includes
  - Endometritis
  - Salpingitis
  - Oophoritis
  - Peritonitis

- m.c.c of PID – Chlamydia > Gonorrhea
- m.c.c of acute PID – Gonorrhea
- m.c.c of PID in IUCD users – Actinomyces
- m.c route of spread of PID – Ascending infection along with sperms

↓

Except – Genital TB

↓

Hematogenous spread

- m.c PID in virgin females – Genital TB

Risk factors

- multiple sex partners – m.c
- Low socio – economic status
- Douching
- Young age of intercourse (10 – 19yrs)
- History of instrumentation

Protective factor

- Barrier methods – Protect against PID

Gonococcal infection

00:05:03

- Squamous epithelium is resistant to gonococcal infection
- m.c site of asymptomatic carriage of gonococcal infection in females – Endocervix
- Other sites – urethra / Bartholin glands
- Gonococcal vaginitis – not seen in young females

Active space

- Theoretically, gonococcal vaginitis can occur in new born females (vagina – lined by transitional epithelium)

Spread of gonococcal infection

00:11:12

- From cervix – Spreads to endometrium

↓

Causes endometritis

↓

Salpingitis
Oophoritis

- From Fallopian tube when infection spreads to peritoneum

↓

Peritonitis

↓

heals by fine violin string adhesions

↓

Adhesions between liver capsule and parietal peritoneum

↓

leads to Perihepatitis

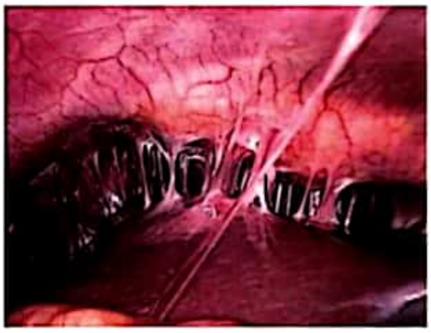
↓

Fitz – Hugh – Curtis syndrome

↓

can lead to infertility / ectopic pregnancy

Violin string adhesions



Diagnosis of pelvic inflammatory disease 00:13:46

- Minimum criteria – Any 1 should be present
  - i) Uterine tenderness
  - ii) Cervical motion tenderness (also seen in ectopic pregnancy)
  - iii) Adnexal tenderness

- Supportive criteria
  - i) Fever ≥ 101.6° F or ≥ 38.3° C
  - ii) Raised WBC count
  - iii) Raised CRP
  - iv) Abundant WBC in discharge
  - v) Lab test positive for gonorrhea and Chlamydia

For gonorrhea
↓
- I.O.C – NAAT (Nucleic Acid Amplification Test)
- Sample – endocervical discharge > urine sample
- Gold standard – Culture (Thayer martin medium)

For Chlamydia
↓
- I.O.C – PCR / NAAT
- Gold standard – culture (mccoy medium)

Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Definitive diagnosis 00:18:11

i) Gold standard for diagnosis – Laparoscopy
↓
Because
↓
- Biopsy can be taken from fallopian tube
- Prognostic scoring for conception can be done – Boer miesel score

ii) Endometrial biopsy – Endometritis

iii) Transvaginal ultrasound – Normally Fallopian tube-not visible on USG

In acute inflammation tubes: inflammed, swollen, occluded distally
↓
Fallopian tubes – visible

Active space

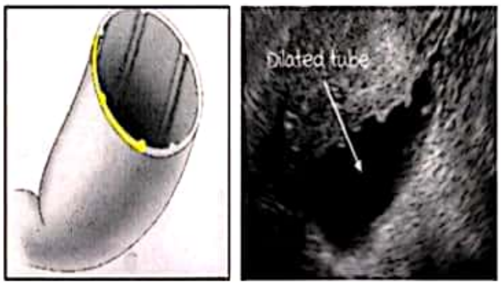
Findings on ultrasound 00:21:07

- Distended / ovoid tube
- Thick inflammed wall
- Fluid present in tube
- Incomplete septa (due to adhesion)

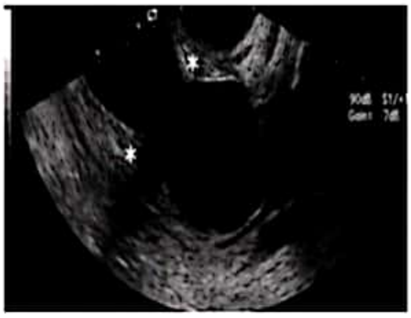
Signs on ultrasound (USG)

- Bead on string Appearance / Cog wheel sign (In transverse section) → Due to endosalpingeal folds which form nodules on fallopian tube
- Waist sign → On longitudinal Section → On Diametrically opposite places – indendation

Bead on strings appearance of tube in PID



Waist sign



Management of pelvic inflammatory disease 00:26:25

- Antibiotics
  - Against gonorrhea/ Chlamydia
  - Against anaerobes

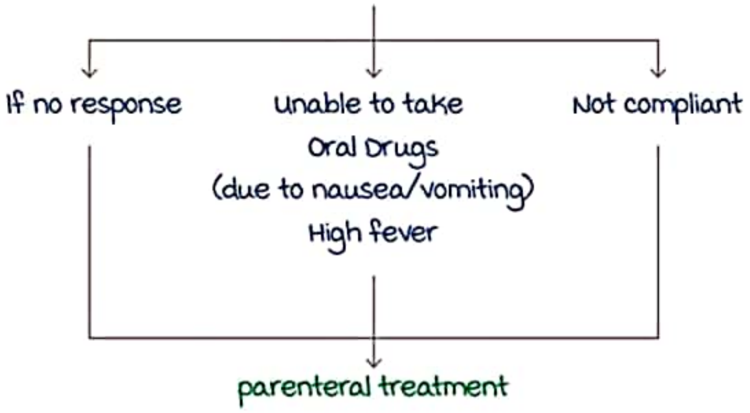
- PID – OPD management

Regime – 1 Ceftriaxone 250 mg IM single dose
+
Doxycyline 100 mg BD X 14 days
+
metronidazole 500 mg BD X 14 days

Regime – 2 Cefoxitin 2 gm IM + Probenecid 1 g oral single dose
+
Doxycyline 100 mg BD X 14 days
+
metroindazole 500 mg BD X 14 days

Indications for hospitalisation in PID

1) Pregnancy
2) Surgical emergency – Appendicitis (if cannot be ruled out)
3) Tubo ovarian abscess
4) Oral treatment


If no response
Unable to take
Oral Drugs
(due to nausea/vomiting)
High fever
Not compliant
parenteral treatment

Regimes for parenteral treatment

- Regime – 1 – Cefotetan 2g IV every 12 hours
+
Doxycycline 100mg orally or IV every 12 hours

- Regime – 2 – Cefoxitin 2g IV every 6 hours
  +
  Doxycycline 100mg orally or IV every 12 hours
- Regimen – 3 – Clindamycin 900mg IV every 8 hours + Gentamycin loading dose IV or IM (2mg/kg), followed by a maintenance dose (1.5mg/kg) every 8 hours.
- Single day dosing (3–5 mg/kg) can be substituted.

Active space

GENITAL TB

Introduction

- mostly Secondary infection
  m.c primary site – lungs > lymph nodes

↓ via hematogenous route

Genital tract

↓

m.c site – Fallopian tube

Ampulla

Least common site – Vagina /Vulva

- m.c PID (Pelvic inflammatory disease) in virgin females

Genital tuberculosis - in fallopian tube 00:01:43

- m.c Site – Ampulla
- m.c symptom of genital TB – Infertility
- Hysterosalpingography (HSG) – contraindicated
- If HSG is done

↓

Characteristic findings

↓

i) Lead pipe appearance of tube
ii) Beaded appearance of tube
iii) Tobacco pouch appearance of tube
iv) Golf stick appearance of tube
v) B/L cornual block
vi) Endometrium – honey comb appearance – Asherman syndrome
vii) moth eaten appearance of tube

- m.c site of blockage in tube due to
  - Genital TB
    ↓
    Cornual end of tube
  - Gonorrhea
    ↓
    Fimbrial end of tube
- m.c.c of B/L cornual block on HSG – Physiological spasm
- m.c pathological cause B/L cornual block on HSG – Genital TB

Endometrial tuberculosis 00:08:26

- From the fallopian tube – infection spreads to endometrium
- m.c route of spread of genital TB – Hematogenous
- m.c route of spread of endometrial TB – Direct spread

Endometrial TB – manifestation

- Pus in uterus
  ↓
  Pyometra
  ↓
  - m.c cause of pyometra – senile endometritis
  - m.c cancer causing Pyometra – Cancer cervix
    2nd – cancer endometrium
    m.c cause of hematometra – imperforate hymen
- Asherman syndrome
  - Intra uterine adhesions
  - Endometrium is thin and defective
  - m.c.c – Postpartum curettage
  - Other causes –
    - Dilation & Curettage
    - MTP
    - Genital TB

Asherman syndrome 00:15:35

- Endometrium is thin and defective
  ↓
  Hypomenorrhea
  Amenorrhea (secondary)
- Diagnosis : I.O.C – Hysteroscopy

- managements – Hysteroscopic adhesiolysis

  +

  Insert balloon catheter

  (to prevent formation of adhesion again)

  +

  Estrogen + Progesterone

  (to make endometrium thick)

Ovarian tuberculosis

00:19:59

- 3rd site to be involved – Ovary (30%)

  ↓

  Congestion of ovary

  ↓

  Polymenorrhea

- Initially in genital TB – polymenorrhea

  ↓

  Amenorrhea

Diagnosis of genital TB

Endometrial biopsy

↓

- Done 1 or 2 days before menstruation
- Also from menstrual blood (within 12 hrs)

menstrual blood – sent for

↓ Culture LJ media (Lowenstein – Jensen media)

↓ Histopathological examination

↓ PCR

Management of Genital TB

- Antitubercular therapy (ATT) – for 6 months (safe in 1st trimester of pregnancy)
- Management of infertility – IVF (Invitro fertilization)

Leave Feedback

One liners

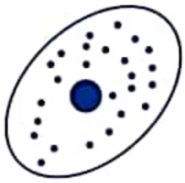
00:25:31

- m.c pelvic examination finding in genital TB – Normal findings
  2nd m.c – Tenderness
- m.c pelvic examination finding in Genital TB in adolescent females
  ↓
  B/L adnexal mass
- Percentage of genital TB patients – infertile – 70%
- Percentage of infertile patients having genital TB
  ↓
  Worldwide – 10%
  India – 17%

Active space

VAGINITIS

	Bacterial Vaginosis	Trichomonas Vaginitis	Candidiasis
Oraganism	Normal (N) Flora of vagina : Döderlein's bacilli ↓ Lactobacilli is replaced by: • Gardnerella • mobiluncus • ureoplasma ureolyticum - No Inflammation ∴ Vaginosis not Vaginitis	Flagellated protozoa ↓ Trichomonas vaginalis	Candida Albicans
most common (mc)	✓	✓	
sexually transmitted disease (STD)	×		Usually not
Symptoms	• Dirty white foul Smelling discharge • No itching No pruritis	• Yellowish green discharge • Pruritis ⊕ • Dysuria	• Cottage cheese like discharge (or) curdy white discharge • Intense itching • Splash dysuria
Signs		Inflamed vagina ↓ Angry looking Vagina (or) Strawberry vagina	
pH of discharge	≥ 4.5	5-6	< 4.5 Can survive in acidic media mc vaginitis in pregnancy

Saline microscopy - IOC	Clue cells  - Vaginal epithelium to which numerous bacteria are adhered	motility ⊕ (flagellated protozoa)	Hyphae / Pseudohyphae
Gold standard Investigation	Gram staining ↓ Nugent Score - Look at the number of Gardnerella (0 - 4) • mobilincus (0 - 2) • Lactobacilli (0 - 4) If score ≥ 7 Bacterial Vaginosis ⊕	Culture ↓ Diamond media	Culture ↓ sabouraud media
DOC :			
Non pregnant	metronidazole 500mg TDS × 7day	metronidazole 500mg TDS × 7days (or) 2g stat (oral)	Fluconazole 150mg - stat
Pregnant	Avoid treatment in 1st Trimester	500mg TDS × 7days	Avoid in 1st trimester
Treatment of ♂ partner	✗	✓	Only if symptoms ⊕

Amsel criteria for diagnosing bacterial vaginosis 00:15:23

Any 3 out of the 4 criteria : diagnostic

1) Dirty white foul smelling discharge thinly coating vagina

2) pH of the discharge ≥ 4.5

3) Clue cells ≥ 20%

4) On adding 10% KOH to discharge → Fish like odour ⊕

↓ Known as (K/a)

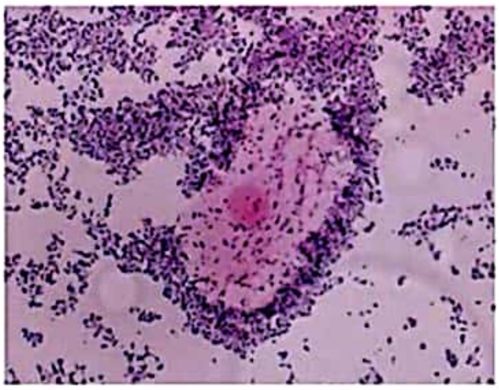
Whiff test
Or
Amine test } Positive

Risk factors for candidiasis :

- Diabetes
- OCP use
- Steroid use
- Antibiotics
- immunocompromised
- HIV

Recurrent Candidiasis : ≥ 4 episodes in an year

Clue cells



MALE INFERTILITY

Infertility - overview 00:00:14

Definition : Inability of a couple to conceive even after regular unprotected sexual intercourse for over 1 year

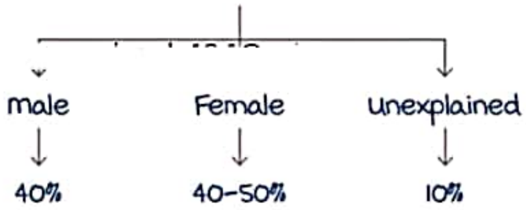
If age of female ≥ 35 years
↓
Start investigation after 6 months of trying

Incidence of infertility: 10-15 %
(Subfertile)

Fecundability: Ability of a female to conceive within a menstrual cycle

Fecundity: Ability of a female to give live birth in a menstrual cycle

Causes of infertility 00:05:21



Male infertility

Semen analysis

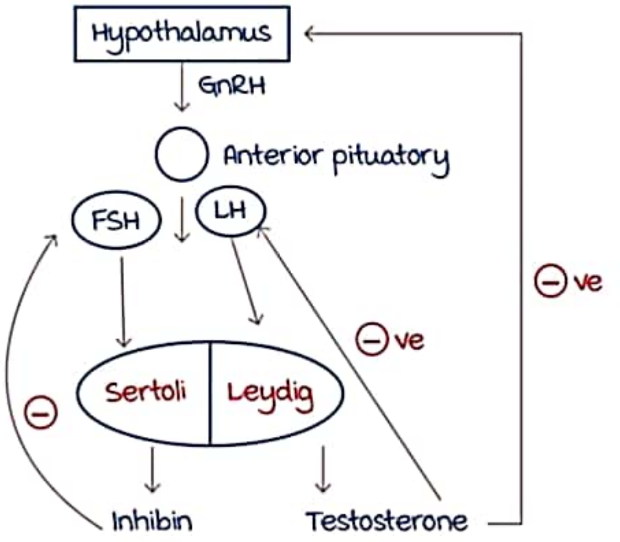
- 1st investigation to be done in an infertile couple
- Sample – masturbation
- Abstinence 2-7 days
- Sample should not be collected in latex condom
- Study of semen should be done on liquified semen

Liquefaction time: 20-30 mins
↓
Sample should reach lab within 60 mins

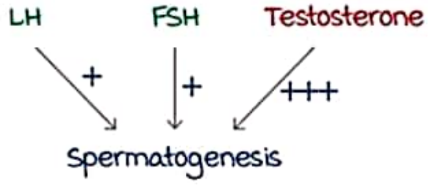
- If semen analysis report is abnormal compulsory
↓
Repeat semen analysis
(atleast 1 month)

Hormonal support of spermatogenesis

00:09:23

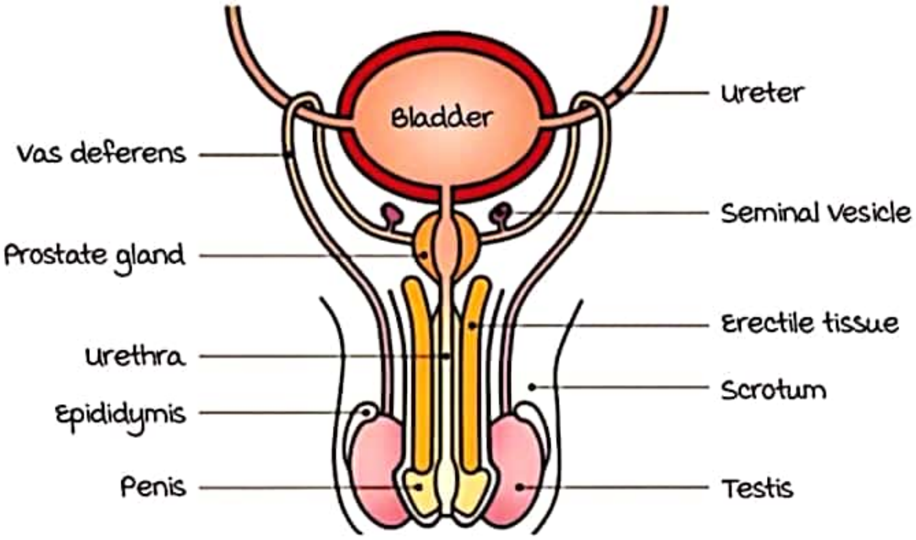

Hypothalamus
GnRH
Anterior pituatory
FSH
LH
⊖ ve
⊖ ve
Sertoli
Leydig
⊖
Inhibin
Testosterone

First stimulus in a baby to produce testosterone: HCG


LH
FSH
Testosterone
+
+
+++
Spermatogenesis

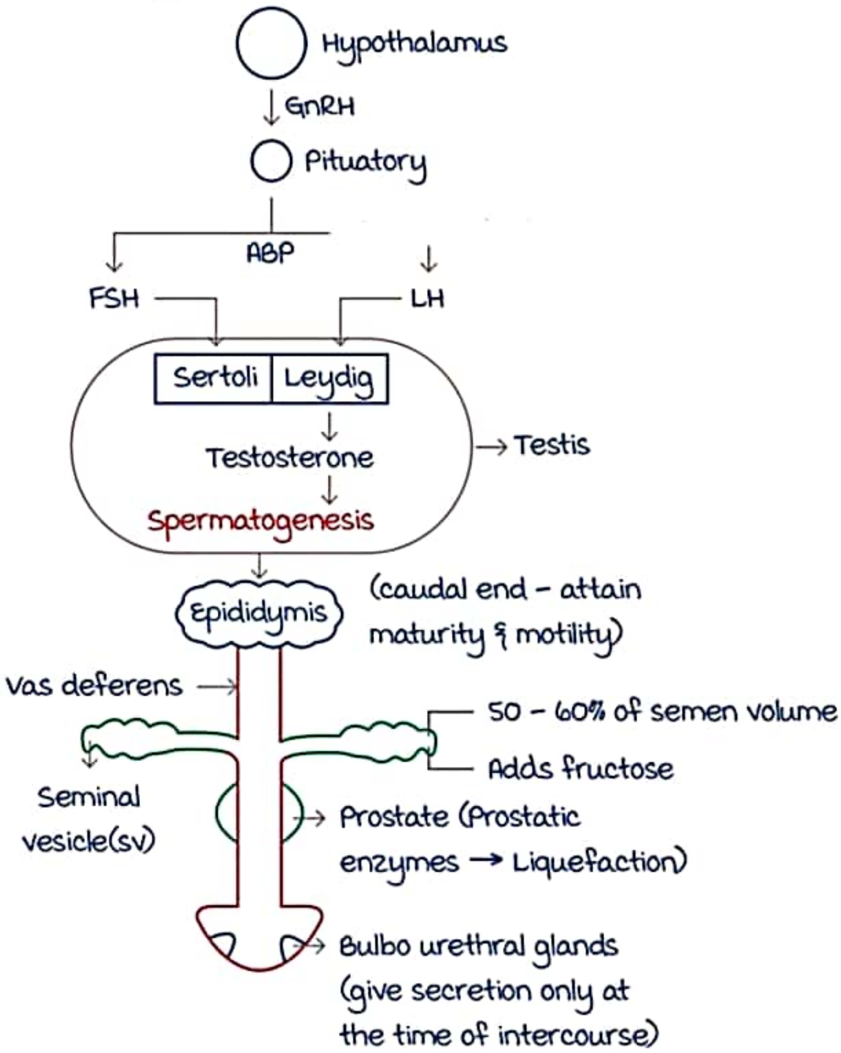
Sperm pathway

00:15:00


Bladder
Ureter
Vas deferens
Seminal vesicle
Prostate gland
Erectile tissue
Urethra
Scrotum
Epididymis
Penis
Testis

Active space

Sperm pathway


Hypothalamus
GnRH
Pituatory
ABP
FSH
LH
Sertoli
Leydig
Testosterone
Spermatogenesis
Testis
Epididymis
(caudal end - attain maturity & motility)
Vas deferens
50 - 60% of semen volume
Adds fructose
Seminal vesicle(sv)
Prostate (Prostatic enzymes → Liquefaction)
Bulbo urethral glands (give secretion only at the time of intercourse)

Semen analysis

00:23:00

- WHO 2010 parameters of normal semen analysis gives the lower limit of normal

1. Volume :> 1.5 ml

2. PH : > 7.2

3. Sperm concentration : > 15 million /ml

4. Sperm count : ≥ 39 million / ejaculate

Average sperm count 60 - 100 million / ejaculate

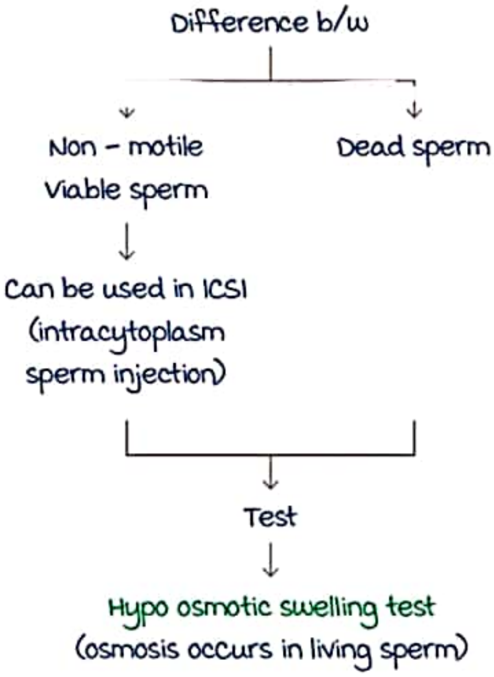
5. Sperm morphology

Strict criteria > 4% normal

6. Total motility > 40%

7. Progressive forward motility > 32%

8. Viability > 58%
9. WBC count < 1 million / ml
   (DOC : any infection in male genital tract → Doxycycline)
10. Total no. of round cells < 5 million /ml (WBC + globular sperms)


Difference b/w
Non - motile Viable sperm
Dead sperm
Can be used in ICSI (intracytoplasm sperm injection)
Test
Hypo osmotic swelling test
(osmosis occurs in living sperm)

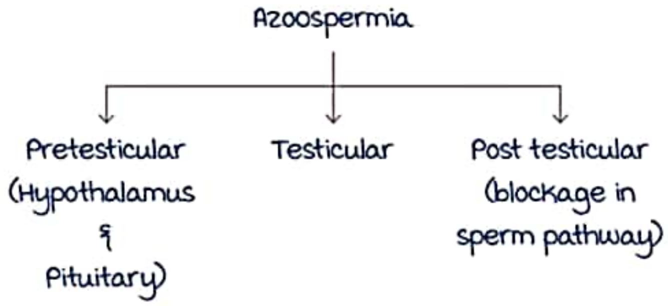
Abnormal semen analysis

00:29:13

1. No semen	Aspermia
2. Sperm concentration < 15 million / ml	Oligospermia
3. Sperm concentration < 5 million / ml	Severe oligospermia
4. Non-motile sperm (motility ↓)	Asthenospermia
5. Sperms with abnormal morphology	Teratospermia
6. Non viable / dead sperms	Necrozoospermia
7. No sperms in semen	Azoospermia
8. ↑ WBC in semen	Leucocytospermia

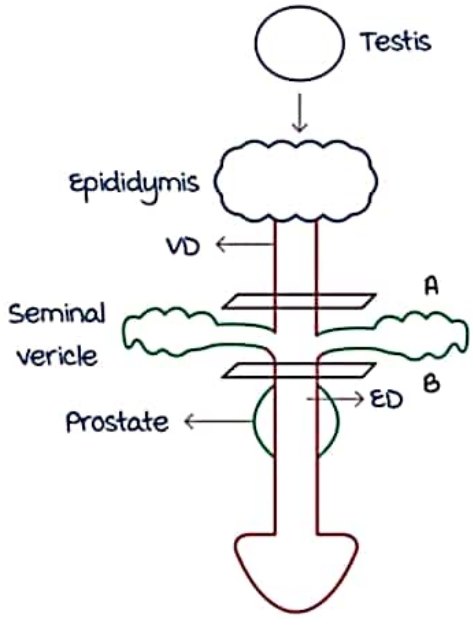
Active space

Azoospermia 00:33:03


Azoospermia
Pretesticular (Hypothalamus & Pituitary)
Testicular
Post testicular (blockage in sperm pathway)

Pretesticular	Testicular	Post testicular
1. Problem in Hypothalamus/ pituitary	1. Testis	1. Sperm pathway
2. LH ↓ FSH↓ Testosterone ↓	2. LH ↑ FSH ↑ Testosterone↓	2. LH normal FSH normal Testosterone normal
3. Spermatogenesis absent	3. ±	3. Normal ↓ Best prognosis

Obstructive azoospermia 00:43:25


Testis
Epididymis
VD
A
Seminal vericle
B
ED
Prostate

Block	
Level A In semen-	Level B In semen-
- Sperms	- Sperms
+ Fluid from SV Good volume Fructose present	- Fluid from SV poor volume Fructose present
+ prostate fluid	+ Prostate fluid
+ Bulbourethral secretions	+ Bulbourethral secretions

If fructose present in semen - indicates block at seminal vesicle - scrotal ultrasound is done to identify the level of obstruction.

Fructose absent in semen

00:52:10

Block in ejaculatory duct
↓
Transrectal ultrasound

B/L absence of seminal vesicles
⊕
B/L vas deferens ansent
↓
CFTR gene testing
(cystic fibrosis)

Mx of obstructive azoospermia
↓
Sperms are present in testis & epididymis

Testis
TESA Testicular sperm aspiration
TESE Testicular sperm extraction

Epididymal
PESA Percutaneous epididymal sperm aspiration
MESA microsurgical epididymal sperm aspiration

↓
Followed by
ICSI
(Intracytoplasmic sperm injection)

Active space

Management of male infertility

00:58:20

Condition	management
1. Oligospermia 10-15 million / ml	Intrauterine insemination
2. Oligospermia 5-15 million /ml	In vitro fertilization
3. Severe oligospermia < 5 million / ml	Intracytoplasmic sperm injection (ICSI)
4. Obstructive azoospermia	ICSI
5. Asthenospermia	ICSI

FEMALE INFERTILITY - 1

Female Infertility :

1. Ovarian cause	: 40%
2. Tubal cause	: 40%
3. Uterine / Cervical cause	: 10%
4. Unexplained	: 10%

Ovarian Causes 00:01:02

WHO Classification :

Class I

- Hypothalamo pituitary ovarian axis failure – 10%
    - Eg: Kallman syndrome – Hypothalamic failure + Anosmia

Class II

- Hypothalamo pituitary ovarian dysfunction – 85% cases – Anovulation
    - Eg: PCOS , ↑ Prolactin levels
    - most easily treatable form of infertility

Class III

- Premature Ovarian failure / Premature menopause – 5%

Tests for Ovulation 00:04:40

Basis:

If female ovulates , progesterone is present
If female does not ovulate , progesterone is absent , then the major hormone in her is estrogen

Time for tests of ovulation: Done on Day 22 of cycle (If regular cycles) if irregular cycles – 1 week before menstruation

Test	If female ovulating (Progesterone +nt)	If female is not ovulating (Estrogen ++)
1. Cervical mucus study	Ferning −ve	Ferning +ve

Other tests for ovulation 00:08:54

2. Vaginal Epithelial study ↓ For Hormonal studies Sample is taken from Lateral upper ⅓rd wall of vagina	Intermediate cells are seen	Pink colored cells with Pyknotic nuclei - Superficial cells are seen
3. Basal body temperature	Temp. increases by 0.2 -0.5°C (or) 0.4 -0.8°F in the mid cycle	Temperature remains constant
4. Endometrial Biopsy (Earlier: Best test) ↓ Not the best test now as it's invasive	Corkscrew appearance/saw tooth appearance of glands filled with Secretions	Simple cystic tubular glands

Indications for Endometrial Biopsy:

- Genital TB
- Leuteal phase defect diagnosis

Important signs of Endometrial Biopsy:

- 1st sign of ovulation on endometrial biopsy: Subnuclear vacuoles appear
- Max. stromal edema: Seen on Day 22 of cycle
- Leukocytic infiltration: Seen on Day 26

Hormonal studies and USG 00:20:20

5. Hormonal study:

• S.Progesterone	≥ 3 ng/ml	< 3 ng/ml
• LH Kits		

$$\text{LH test positive} \xrightarrow{\text{24 hours}} \text{Ovulation}$$

Fertilisable span of ova = 24 hrs, So can have intercourse upto 48 hours

- Hormonal studies: Best test for ovulation.
- Detect ovulation: Best test: S. Progesterone
- Best test to predict ovulation: LH Kit – Testing should be done between 4 pm – 10 pm
- m.c. test for ovulation:

↓

TVS A/K/A follicular monitoring

- Its done from the Day 10 of the cycle, everyday the size of follicle increases from 2 -3 mm/day

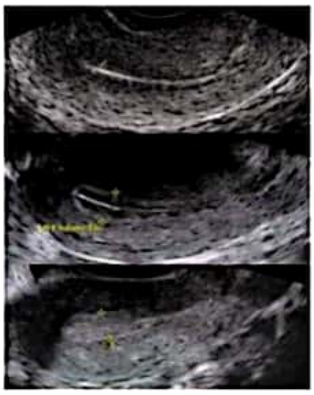
↓

Reach a size of 18 – 20mm

  - Then the size of follicle decreases suddenly
  - Fluid in pouch of douglas.
  - Endometrium will appear triple layered → Trilaminar appearance of endometrium
- USG of endometrium at different times of cycle
  - In proliferative phase → Estrogen ++

↓

Endometrium appears in the form of single white line



- At the time of ovulation → Endometrium shows 3 layers K/a trilaminar endometrium
- In the Secretory phase → Endometrium appears as a single line but it will be thick with posterior enhancement

Management of anovulation

00:30:58

- Same as management of PCOS
- 1st line:
  - DOC for anovulation in PCOS: Letrozole > Clomiphene citrate
  - DOC for anovulation in obese female with PCOS: Letrozole
  - DOC for anovulation: Clomiphene citrate

Letrozole :

- DOC in PCOS patients
- Its an aromatase inhibitor
- Initial dose: 2.5 mg
- max. dose: 7.5 mg

2. Clomiphene citrate :

- SERM – Clomiphene } Used for ovulation induction
  Tamoxifen
  Raloxifene – Not used for ovulation induction
- Initial dose: 50 mg/day
- max. dose: 100 mg/day
- Obese female with anovulation: Clomiphene citrate + metformin
- Increased prolactin levels + anovulation: Clomiphene citrate + Bromocriptine
- Anovulation + obese → 1st step:
  - Advise her for weight loss
  - Dietary modification
  - Physical exercise
  - morbidly obese: Bariatric surgery
  - Simply by weight loss: 10-15% cases ovulate
  - Best time to conceive after Bariatric surgery: 12-18 months
- 2nd line management:
  - HMG (Human menopausal Gonadotropin)
- 3rd line mx:
  - Gonadotropins in pulsatile manner

Clomiphene citrate

00:40:16

- ↓ the levels of estrogen

  ↓

  –ve feedback on FSH is gone

  ↓

  FSH ↑

  ↓

  Number of follicles start growing

- Prerequisite for clomiphene citrate Intact HPO axis

- MC S/E of clomiphene citrate:
  - Hot flushes
  - menopause like symptoms
  - Can lead to multifetal pregnancy
  - Chances for twin pregnancy: 5 – 8%
- Give clomiphene from D_2 – D_6 of the cycle

  ↓

  From D_{10} – DO follicular monitoring

  ↓

  When follicles become 18 – 20 mm in size

  ↓

  Give inj.hCG – acts as ovulation trigger (similar to LH surge)

  ↓ after 36 hrs

  Ovulation
- % Chance of ovulation with clomiphene citrate: 80%
- Pregnancy rates with clomiphene citrate: 30-40% due to dryness of vagina
- Inj. hCG → Trigger ovulation
  - Sometimes cause ovulation hyperstimulation syndrome (OHSS)
  - To prevent OHSS: Create ideal conditions to give inj.hCG.
    - Estrogen should be: 450 – 1000 pg/ml
    - There should be 1 or 2 follicles which are ≥ 16 mm size.
    - Thickness of endometrium: 8 mm
  - Do not give inj.hCG if Estrogen (E2) ≥ 3500 pg
- Chances of multiple pregnancy: max.with hmG (30%) > clomiphene Citrate (5 – 8%) >GnRH
- Chances of OHSS: hmG: 5%

  Clomiphene citrate: 1%

OHSS

[illegible]:26

- Ovarian Hyperstimulation syndrome.
- All ovulation inducing drugs

  ↓

  Directly or indirectly increasing FSH

  ↓

  multiple follicles gets stimulated

  ↓

↓

↑ Estrogen production (E_2)

Each follicle releases 150 – 200pg of E_2

↓

Responsible for OHSS

- If $E_2 \geq 3500$ pg, chances of OHSS are 1.5%
- If $E_2 \geq 6000$ pg, chances of OHSS are 40%
- When E_2 levels are increased

↓

↑ Inflammatory cytokines like VEGF and interleukins

↓

Make leaky capillaries + stimulate RAAS (Electrolyte imbalance)

- Cellular components stay inside

↓

- Hemoconcentration
- HCT ↑
- ↑ chances of thrombosis
- ↑ DIC

Liquid components come out through leaky capillaries

↓

Get collected in the third space

↓

- Ascites
- Hydrothorax
- Pleural effusion

- Size of the ovary ↑ses due to big follicles
- Becomes tense, may undergo torsion of ovary, rupture, hemorrhage of ovary
- Controlled stimulation of ovaries – to prevent hyperstimulation

Risk factors for OHSS:

1. Age < 35 years
2. Case of PCOS
3. Thin female

Active space

4. Anti Mullerian Hormone > 3.3
   - From puberty onwards, the granulosa cells of small follicles Secrete AMH

- AMH is increased, that indicates is increase in number of small follicles

5. If E2 levels ≥ 3500 pg
6. Inj.hCG
7. If no. of follicles are increased:
    - If there are ≥ 13 follicles and they are > 11mm in size, that predicts OHSS may occur
    - If the follicles are > 20 in number, then the incidence of severe OHSS is 15%
8. Pregnancy
    - In pregnancy hcG is produced
      ↓
      Triggers or worsens the OHSS
    - m.c. cause of late OHSS is pregnancy.

Classification of OHSS

OHSS

Early
- Occurs within 9 days of using inj.hCG which is used as ovulation trigger

Late
- Occurs > 9 days after inj.hCG
- mcc of late OHSS : Pregnancy

Grades of OHSS :

Grade 1 :
- mild
- Patient complains of abdominal distentson or discomfort
- On USG, size of ovary = max upto 5 cms

Grade 2 & 3 :

moderate (Grade 2 and 3)

Grade 2 moderate: size of ovary: 5-12 cms

Grade 3 moderate: USG evidence of ascites

Severe OHSS: Grade 4 & 5:
- Grade 4: Clinical evidence of ascites, pleural, pericardial effusion
- Grade 5: Hemoconcentration
    - DIC
    - ↓ Renal perfusion
    - Thrombosis

Active space

Management :

- Manage hypovolemia – IV fluids , colloids
- Heparin to prevent thrombosis
- For tensed ascites: Paracentesis

Prevention of OHSS :

- By delaying Inj.hCG if E2 ≥ 3500 pg/ml + Stop Gonadotropins } K/a Coasting
- Decrease dose of hCG
    - From 10,000 IU to 5000 IU or 2500 IU
- Cancel the cycle
- Cryopreservation of embryos

WHO category III

01:16:00

- Premature menopause / premature ovarian failure
- If menopause occurs in a female < 40yrs

↓

No. of follicles are decreased

Tests for Ovarian Reserve :

1. S.FSH levels on Day 3 of the cycle

↓

If ≥ 45 pg → Premature ovarian failure.

2. Day 3 Inhibin levels

↓

< 45 IU → Premature ovarian failure.

3. Antral follicle count – TVS – If in both ovaries , follicles < 10 , indicates
Premature ovarian failure – Done on D_3 – Quantitative test

- Anti mullerian hormone

↓

< 0.5: Poor ovarian reserve

    - Can be done on any day of the cycle – Best test for Ovarian Reserve

Active space

- Outdated test: clomiphene citrate challenge test:
    - On D_3 – measure FSH levels
    - From D_5 – D_9: Give clomiphene citrate
    - measure FSH levels on day 10 – FSH ↑↑
- S. Estradiol level – Insignificant in case of ovarian Reserve

Management :

- Take donor eggs + husband sperms

↓

Do IVF

FEMALE INFERTILITY - 2

Tubal causes of Infertility :

- IOC : HSG
    - HSG done with the help of Leech Wilkinson cannula
    - With Leech Wilkinson cannula , inject a radio opaque dye in the uterus and tubes

      ⇓

      Check Dye Spillage → If present – Both tubes are patent & open
    - No need of surgery for U/L block
    - Do HSG on Day 10 – Always Preovulatory

Indications for HSG :

- For tubal infertility
- For uterine pathologies :

  Asherman syndrome
  Polyp
  Fibroid
  Mullerian malformations

Drawbacks of HSG :

- Exterior of the tube cannot be visualised.
- Spasm of the cornual end of the tube . It appears like B/L cornual block
- mcc of B/L cornual block on HSG – Physiological spasm of cornual end of tube
- mc pathological cause of B/L cornual block on HSG – Genital T.B.
- Gold std. investigation for tubal infertility – Laparoscopic chromopertubation
- Other investigations for tubal infertility – Saline infusion Sonography.

Causes of tubal infertility :

1. Endometriosis
2. PID
3. Salpingitis

4. Genital T.B

↓

All these cause blockage and adhesions in the tube

↓

Infertility

- Treatment is done only if there is B/L blockag

Blockage of tube

↓ Proximal / cornual block

↓ midsegmental block

↓ Distal block

B/L Cornual block :

mcc : Physiological sphincter spasm.

↓

Next step : Take a thin guide wire, under hysteroscopic guidance pass it into the tube

this is called as Hysteroscopic Cannulation.

This should be followed by Laparoscopic chromopertubation

↓

most of the times , block gets relieved

↓ if not relieved

It means , its a pathological block. (mcc : Genital T.B)

↓

Best management : IVF

B/L Distal block :

Distal block

↓ mild block ↓ Fimbriectomy

↓ Severe block ↓ IVF

- Best management of tubal infertility : IVF

Mid Segmental block:

- It means that tubectomy was done in the past

- patient comes for reversal of tubectomy
- 1st step : Husband's Semen analysis
  ↓
  - If normal : Recanalisation /Reversal.

Factors affecting Recanalisation :

1. Technique of sterilization

   Clips (Best) > Falope ring

   - Least possible : Cautery

2. Type of anastomosis :
   - Best if there is isthmo isthmic anastomosis

3. Reconstruct ≥ 4 cms of the tube chances of reversal are good,

Uterine and cervical causes of infertility 00:20:36

Cervical Causes :

- There's a problem with the cervical mucus
  - Thick and impermeable mucus → Sperms cannot ascend.
  - Impermeable mucus : Insler score

    Score : 10 – 12 : Good cervical mucus.
  - Presence of Antisperm Antibodies – immunological cause of infertility
  - For screening : Post coital test / Sims test /Huhner test

    Done on D10 – D12 of the cycle

Test for infertility	Day performed
1. Ovulation tests	D22
Follicular monitoring	D10
2. Tests for ovarian reserve	D3
AMH	Any Day
3. HSG	D10
4. Post coital test	D10 – D12

- In Sims test : Forward movement of sperms ⇒ presence of Anti sperm Ab's
  - Diagnostic test for Antisperm Ab's :

    1. Immuno bead Assay
    2. Sperm agglutination test
    3. Sperm mobilisation test

Management of Cervix infertility:

- Intrauterine Insemination (IUI)
- m_x of unexplained infertility : Clomiphene citrate f/b IUI × 3 cycles

↓ fails

IVF

IUI

00:28:14

- Semen taken from male (can be Husband = IUI H
  Can be Donor = IUI D)
- Process and centrifuge the semen. Can be done in 3 techniques
  i. Swim up technique
  ii. Swim down technique
  iii. Density centrifugation technique
- 0.5 ml of processed and centrifuged semen, with the help of catheter, put in the uterus. (By passing area of Cx)

Prerequisites before IUI :

1. Sperm concentration ≥ 10 million/ml
2. Sperm morphology atleast 14% normal

Indications of IUI :

1. If male has ejaculatory problems
   - Hypospadias
   - Epispadias
   - Retrograde ejaculation
2. If male has Neurogenic impotence.
3. If male has oligospermia, but sperm count is between 10 – 15 million/ml
4. If male partner has a hereditary disease, risk of transferring the disease to the offspring. In this case, go for IUI D
5. If in female cervix : Antisperm antibodies are present.
6. If female has vaginismus.

Active space

IVF

00:34:15

- From male partner : Take Semen , process and centrifuge it
- For female : Give clomiphene citrate / hmG /GnRH

↓

Hyperovulates

↓

Do a follicular monitoring from D_{10} of cycle

↓

When follicles reach 18 – 20 mm size

↓

Give inj. hCG (ovulation trigger)

↓ after 24–36 hrs

Do oocyte retrieval under USG guidance

↓

Put both sperms and oocyte into petridish in
50,000 – 1.5 lakh sperms per oocyte

↓

Fertilisation occurs and Embryo is formed

↓

On D_3/D_5 implanted in uterus 2 cms below the fundus

- Success rate of IVF : with 1 Embryo : 20–30%
- Cumulative success rate : 40–50%

Limitations of IVF :

- Severe oligospermia
- Obstructive azoospermia
- Asthenospermia.

Indications for IVF :

In males : Oligospermia : 5–15 million sperms/ml
Repeated IUI Failures.

In Females : B/L blockage of tube

4. In ↓ ovarian reserve

↓

Do IVF – with Donor Eggs

Active space

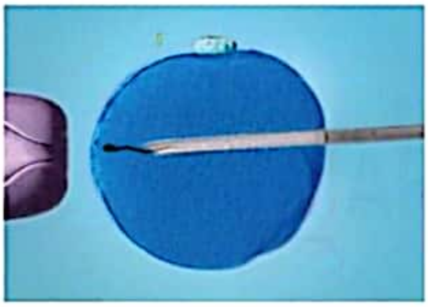
- In mullerian agenesis
  ↓
  IVF + Surrogacy

ICSI

00:44:14

Intracytoplasmic Sperm Injection

- Everything is same as IVF except a single sperm is injected into the cytoplasm of the oocyte



Indications of ICSI :

- All Indications of IVF + Limitations of IVF
- most important parameter in ICSI : morphology of sperm
- most important parameter for IVF : motility > Sperm concentration
- In semen analysis , most important parameter : morphology >motility > Sperm concentration

PUBERTY

Puberty in females	Puberty in males
• Average (avg) age of puberty 10.5 yrs	11.5yrs
• 1st Sign: Growth spurt	Testicular Enlargement ↓ Penile enlargement ↓ Pubarche ↓ Peak Height velocity
• 1st visible sign: Thelarche (Breast budding) ↓ Pubarche (appearance of Pubic hair & axillary hair) ↓ Peak height (ht) velocity ↓ menarche – 12.5 years (onset of menstruation) mnemonic: Gross BPH in male	
Precocious Puberty: <8 y	<9 y

Precocious menstruation:

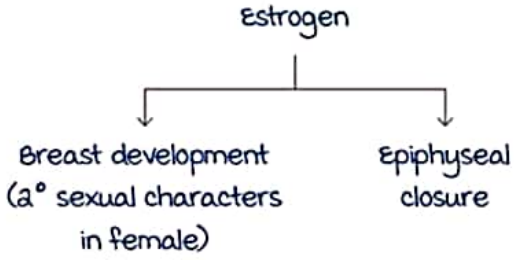
- menstruation in <10 y of age
- Precocious puberty is more common(mc) in females
- most common cause (mcc) of precocious puberty in females : Idiopathic (90%)
- In 10% cases, precocious puberty can be due to Brain tumors like Hamartomas, therefore, MRI brain- mandatory
- DOC (drug of choice) : Continuous GnRH

Delayed puberty:

• If 2° sexual characteristics (Breast) not developed by 13 years	If 2° sexual characteristic (Breast) not developed by 14 yrs • Delayed puberty is mc in boys • MCC: Constitutional delay • DOC: Pulsatile GnRH

Important points about puberty in females:

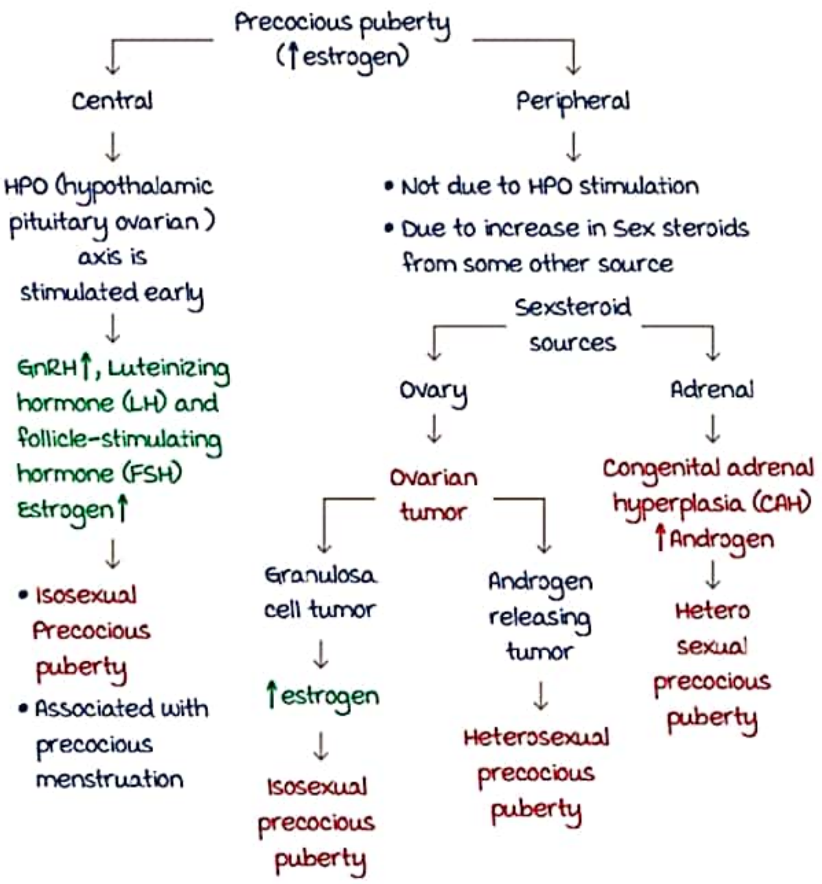
- most important hormone for puberty in females: Estrogen


Estrogen
Breast development (2° sexual characters in female)
Epiphyseal closure

- In females, for pubic hair development & axillary hair development, the hormones that are responsible are Androgens
- Tanner staging for Breast and pubic (change everywhere) hair development
- Tanner's stages – 5 stages
  - 1st / 2nd stage – Less or premature breast or pubic hair
  - 4th / 5th stage – Breast and (change everywhere) hair are fully matured

Precocious puberty

00:10:40


Precocious puberty (↑estrogen)
Central
HPO (hypothalamic pituitary ovarian) axis is stimulated early
GnRH↑, Luteinizing hormone (LH) and follicle-stimulating hormone (FSH) Estrogen↑
• Isosexual Precocious puberty
• Associated with precocious menstruation
Peripheral
• Not due to HPO stimulation
• Due to increase in Sex steroids from some other source
Sexsteroid sources
Ovary
Ovarian tumor
Granulosa cell tumor
↑estrogen
Isosexual precocious puberty
Androgen releasing tumor
Heterosexual precocious puberty
Adrenal
Congenital adrenal hyperplasia (CAH) ↑Androgen
Hetero sexual precocious puberty

- MCC of peripheral precocious puberty: GCT (granulosa cell tumor)
- Not associated with precocious menstruation
- Another cause of peripheral precocious puberty:
  McCune Albright Syndrome syndrome
    - Precocious puberty
    - Café-au-lait spots
    - Polyostotic fibrous dysplasia

Causes of heterosexual precocious puberty 00:18:45

- CAH
- Androgen secreting tumor of ovary
- Cushing syndrome
- Exogenous androgens

Adrenarche:

- Onset of production of androgens (DHEA and DHEA sulphate) from the adrenal glands
- Normally starts at 6 years of age

PRIMARY AMENORRHEA

Amenorrhea : 00:0:40

- Absence of menstruation

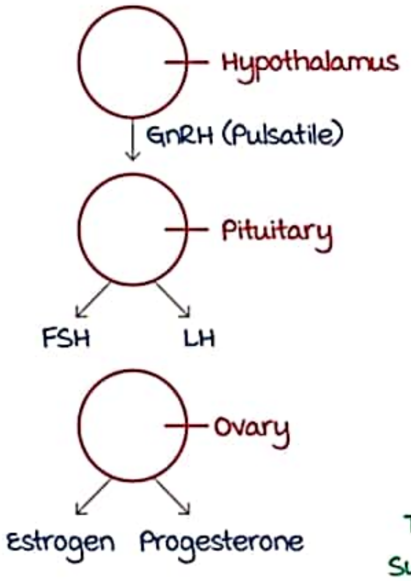
Primary

- Never experienced menstruation
- Does not attain menarche by 13 years of age, in absence of secondary sexual characteristics
  or
  15 years of age irrespective of secondary sexual characteristics
  or
  If there is a difference of 3 or more years between the onset of puberty and menarche

Secondary

- Not menstruating for > 90 days with previous h/o normal menstruation
  or
  If a female who has oligomenorrhea having less than 9 cycles in an year

Primary amenorrhea : 00:05:50

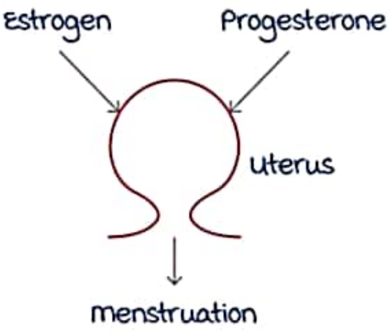


Causes → Kallmann Syndrome (46xx)

Causes → Craniopharyngioma

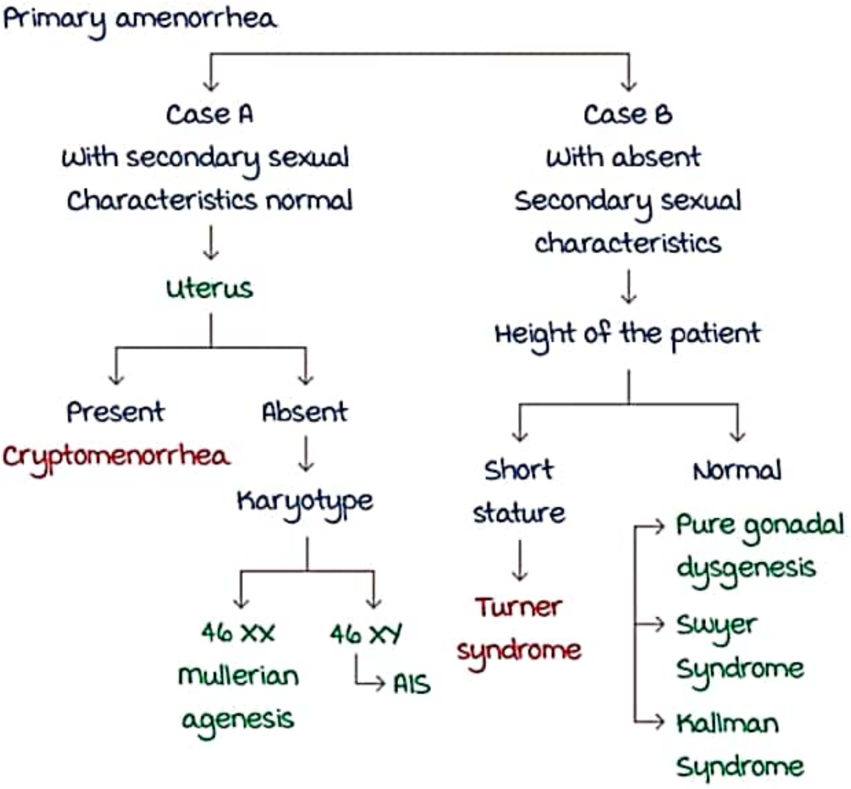
Causes → Gonadal dysgenesis

- Turner Syndrome (45 XO)
- Pure Gonadal dysgenesis
- Swyers Syndrome (46 XY)


Estrogen
Progesterone
Uterus
menstruation

Causes : mullerian agenesis
(46XX)
Androgen insensitivity
syndrome (testiular
feminizing syndrome
46XY)

- most common cause of primary amenorrhea →
  - main cause → Gonadal dysgenesis
  - 2nd → Turners syndrome (45 XO)
- Second most common cause is → mullerian agenesis 46XX
- Third most common cause is → Androgen insensitivity syndrome (46 XY)
- Best Investigation for primary amenorrhea is Karyotyping


Primary amenorrhea
Case A
With secondary sexual
Characteristics normal
Uterus
Present
Cryptomenorrhea
Absent
Karyotype
46 XX
mullerian
agenesis
46 XY
AIS
Case B
With absent
Secondary sexual
characteristics
Height of the patient
Short
stature
Turner
syndrome
Normal
Pure gonadal
dysgenesis
Swyer
Syndrome
Kallman
Syndrome

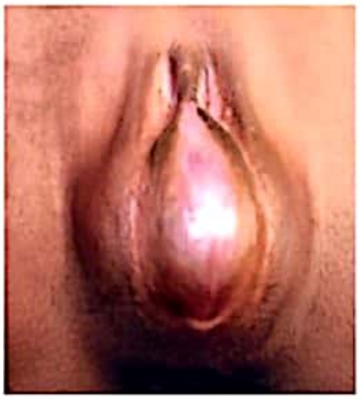
Cryptomenorrhea

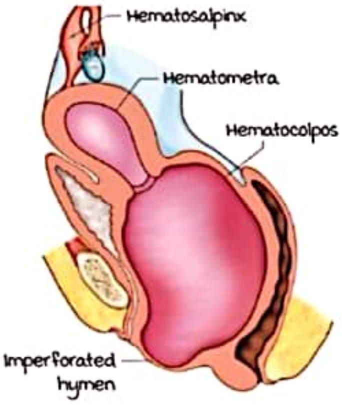
00:16:35

- Normal menstrual cycles without any sign of bleeding
  ↓
  due to some obstruction in genital tract
  - Imperforate hymen (m.c)
    → Cyclical Abdominal pain every month but there is no bleeding
    - Blood collects in vagina, cervix and uterus → Hematocolpos
      ↓
      Hematometra
      ↓
      P/A → Uterus may be Palpable
  - Tranverse Vaginal Septum
  - Vaginal atresia
    ↓
    Lower 1/3rd of vagina which is developed by urogenital sinus is absent

- most common cause of hematometra → Imperforate hymen
- P/V → Contraindicated in a virgin female
  - Virgin female
  - Placenta previa
  - PROM
- P/R → Bulky uterus

Local examination → Tensed bluish bulging hymen





management :

- Cruciate incision on hymen

Mullerian agenesis

00:25:20

- Chromosome number is 46 XX

↓ Y chromosome : absent

Gonads → Ovaries

|

Normal

↓

→ Ovulation : normal

→ Levels of estrogen normal

↓

Secondary sexual
Characters : normal

Problem →

- Both mullerian ducts are absent
  - Fallopian tube
  - uterus
  - cervix
  - upper vagina

  } Absent
- Primary amenorrhea
- Coital difficulties

Structures present in mullerian agenesis :

1. Both the ovaries
2. Lower part of vagina
3. Rarely → distal part of fallopian tube

If female also has :

1. Renal anomalies (15 –30%), m.c renal agenesis → Horse shoe shaped Kidney

+

2. Skeletal anomalies → Hemivertebra
Scoliosis
Spina bifida
Abnormalities of
Cervical spine

+

3. Auditory problems → Mayer Rokintansky Kuster Hauser syndrome (MRKH syndrome)

↓

Abnormal galactose metabolism

Diagnosis :

- USG → Uterus is absent
- Karyotyping
- Intravenous pyelography

Management :

1. Cannot initiate menstruation in the patient (uterus absent)
2. Coital difficulties (in future)

↓

Do vaginoplasty

Best time

Just before or Just after marriage

Best method

→ MC Indoe Vaginoplasty

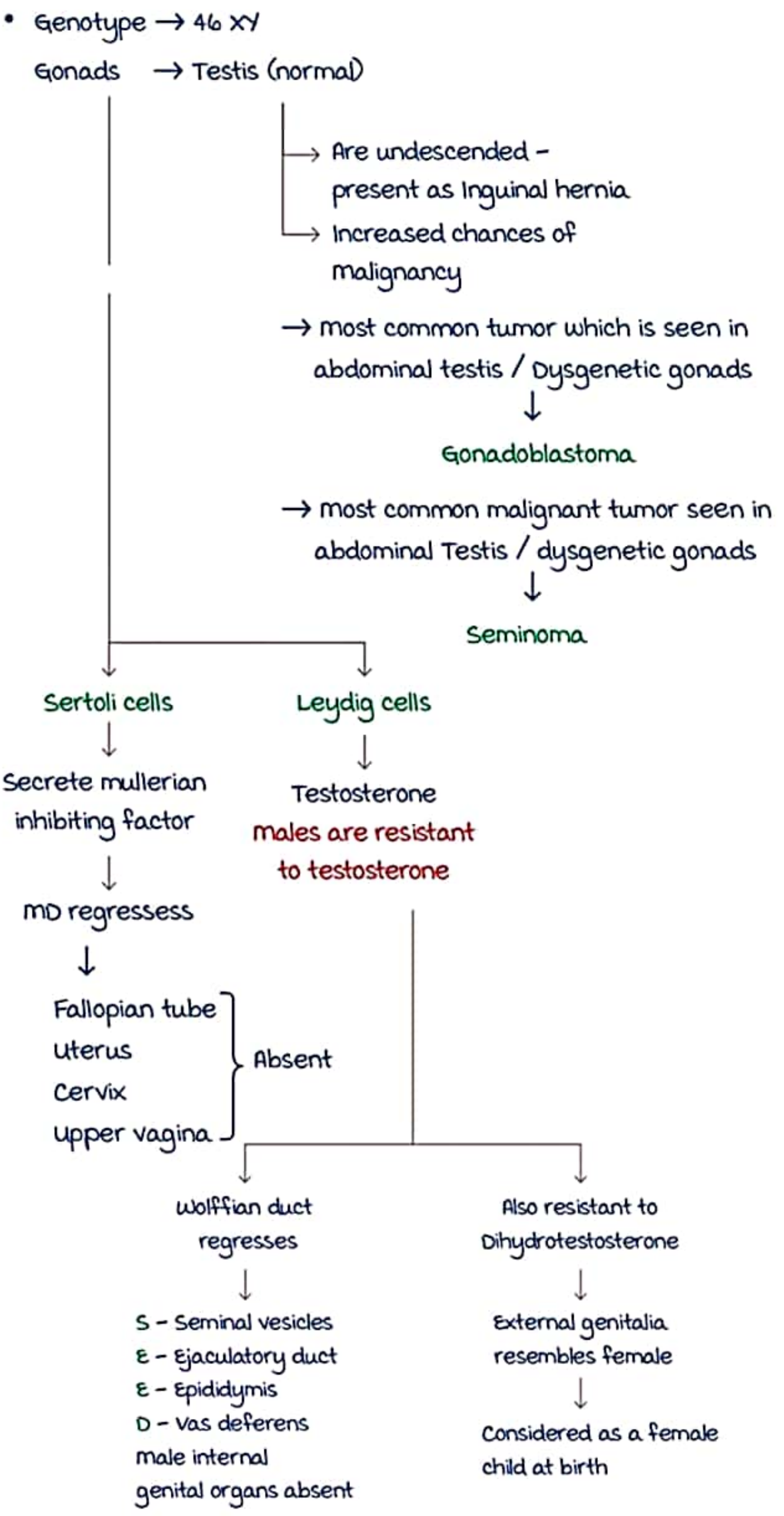
→ Veichetty technique

→ Williams Vaginoplasty

3. Female cannot become pregnant but can have own biological child by IVF + Surrogacy

Androgen insensitivity syndrome

00:38:10



- Genotype → 46 XY

Gonads → Testis (normal)

→ Are undescended - present as Inguinal hernia

→ Increased chances of malignancy

→ most common tumor which is seen in abdominal testis / Dysgenetic gonads ↓ Gonadoblastoma

→ most common malignant tumor seen in abdominal Testis / dysgenetic gonads ↓ Seminoma

Sertoli cells ↓ Secrete mullerian inhibiting factor ↓ MD regressess ↓

Fallopian tube
Uterus
Cervix
Upper vagina

} Absent

Leydig cells ↓ Testosterone

males are resistant to testosterone

Wolffian duct regresses ↓

S - Seminal vesicles
E - Ejaculatory duct
E - Epididymis
D - Vas deferens
male internal genital organs absent

Also resistant to Dihydrotestosterone ↓ External genitalia resembles female ↓ Considered as a female child at birth

Child attains puberty

At puberty → Resistant to testosterone

↓ Secondary sexual Characteristics of male do not develop

↓ Testosterone ↑

In adipose tissue | Aromatase ↓

Estrogen

Not resistant to estrogen

↓

Breast development occur corresponding to Tanner stage 4 or 5

Note → In females also for pubic hair and axillary hair , the hormone needed is Androgen. Since these children are resistant to androgen, therefore pubic hair and axillary hair do not develop properly (corresponding to Tanner stage 1 or 2)

Definitive diagnosis : Karyotyping

Management :

1. Continue to accept them as females
2. Gonadectomy → After breast development is complete (14 - 16 years of age)
3. Estrogen replacement therapy
4. Vaginoplasty - Technique and time of process same as mullerian agenesis
5. Cannot become pregnant
6. Cannot have own biological child

Complete AIS	Partial AIS	Reifenstein Syndrome

Complete AIS, Partial AIS ↓ X linked Recessive disorders

Reifenstein Syndrome ↓ Not X - linked disorder

Partial androgen insensitivity syndrome

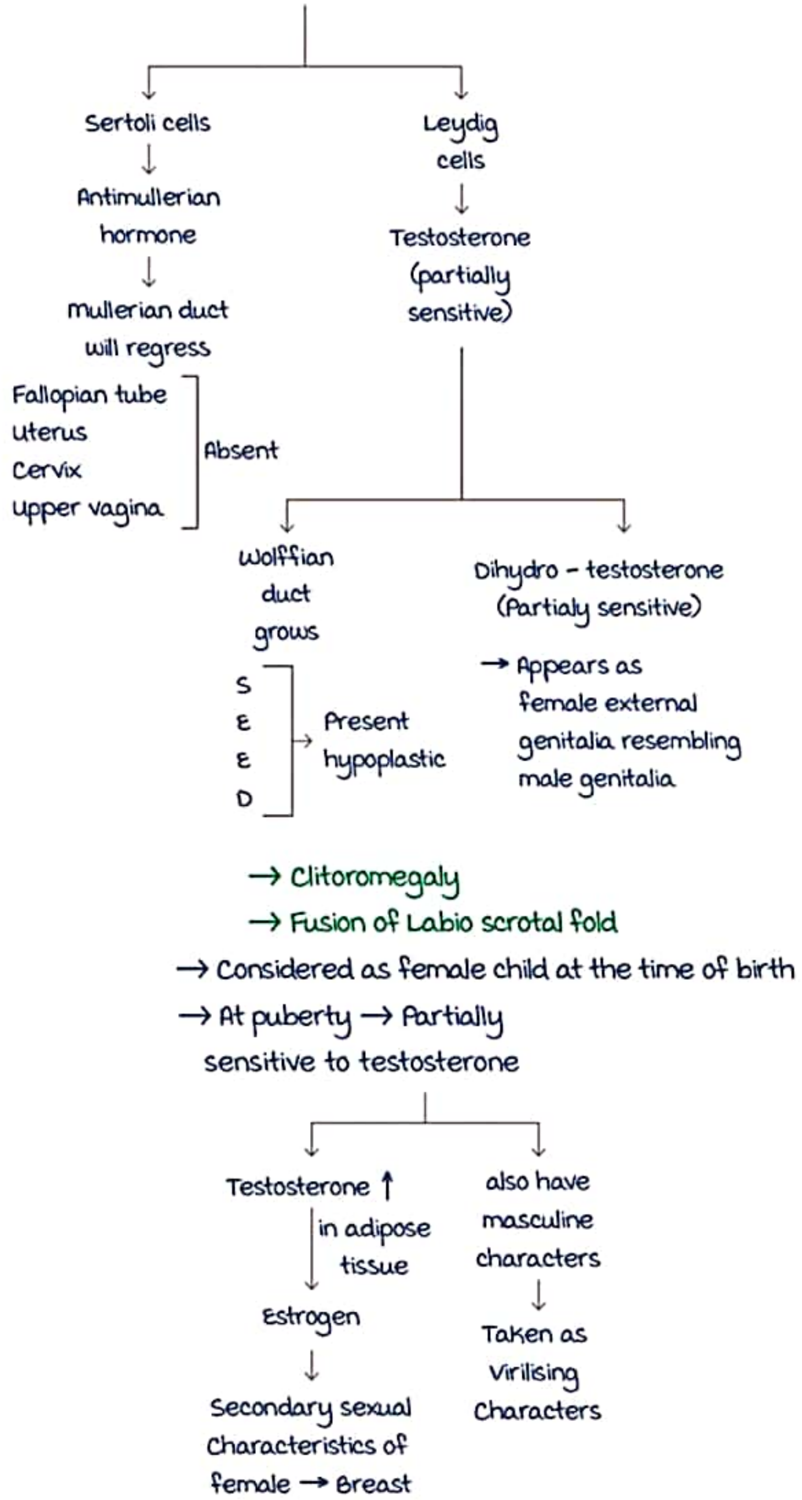
00:58:42

- males are partially insensitive to testosterone
- Genotype → 46 XY

↓

Gonads → Testis – Intra abdominal

patient complains of inguinal hernia



Sertoli cells ↓ Antimullerian hormone ↓ mullerian duct will regress

Fallopian tube
uterus
Cervix
upper vagina
] Absent

Leydig cells ↓ Testosterone (partially sensitive)

Wolffian duct grows

S
E
E
D
] → Present hypoplastic

Dihydro – testosterone (Partialy sensitive)

→ Appears as female external genitalia resembling male genitalia

→ Clitoromegaly

→ Fusion of Labio scrotal fold

→ Considered as female child at the time of birth

→ At puberty → Partially sensitive to testosterone

Testosterone ↑ in adipose tissue ↓ Estrogen ↓ Secondary sexual Characteristics of female → Breast

also have masculine characters ↓ Taken as Virilising Characters

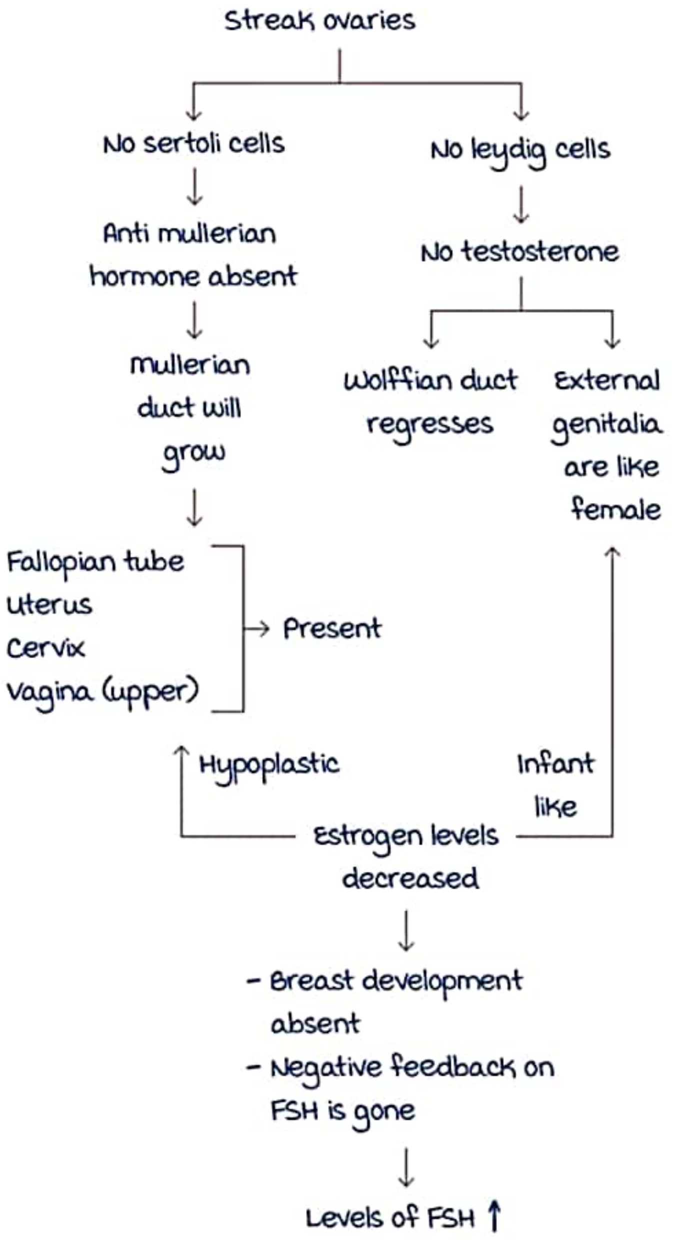
Complete AIS	Incomplete AIS
Complains of Inguinal Hernia + primary Amenorrhea +Breast → Tanner 4 or 5 + Less pubic hair and axillary hair	} ⊕ Clitoromegaly or Labioscrotal fusion

Reifenstein syndrome 01:07:37

- Androgen insensitivity
  ↓
  Very less
  - ↓ Wolffian duct grows
    ↓
    S, E, E, D] Present (less developed)
  - ↓ External Genitalia will be male (hypospadias or Bifid scrotum)
    ↓
    Taken as male child
- Male with ↓ Testosterone
  ↓
  Undervirilized male
  Complains of infertility
  Gyneacomastia

Turner syndrome : 01:10:40

- Chromosome number → 45 XO
  ↓
  Y chromosome is absent
  → Gonads → Ovaries
  → Only 1 X Chromosome present
  These ovaries not properly developed → Streak ovaries


Streak ovaries
No sertoli cells
No leydig cells
Anti mullerian hormone absent
No testosterone
mullerian duct will grow
Wolffian duct regresses
External genitalia are like female
Fallopian tube
Uterus
Cervix
Vagina (upper)
Present
Hypoplastic
Infant like
Estrogen levels decreased
- Breast development absent
- Negative feedback on FSH is gone
Levels of FSH ↑

- In these patients there is mutation of SHOX gene → Short stature
- Streak ovaries → No ovulation

↓

↓Progesterone

↓

LH ↑

$\underbrace{\text{Hypergonadotropic}}_{\uparrow \text{ LH and FSH}}$ $\underbrace{\text{Hypogonadism}}_{\downarrow \text{ Estrogen}}$

Additional features :

1. Cubitus valgus
2. Short 4th metacarpal
3. Low posterior hairline
4. webbing of neck
5. Shield shaped chest
6. Widely spaced nipples
7. Increases risk of heart disease
   - Bicuspid aortic valve (m.c)
8. Increased chances of autoimmune disease → Diabetes mellitus
   Hashimoto's
   thyroiditis

Intelligent Quotient is normal in turner syndrome

In Klinefelter syndrome IQ is decreased

Management :

- Estrogen alone for 1 year for proper breast development

↓

Estrogen + Progesterone later on

Pure gonadal dysgenesis 01:21:30

- 46 XX → But due to unknown reasons they have streak gonads

↓

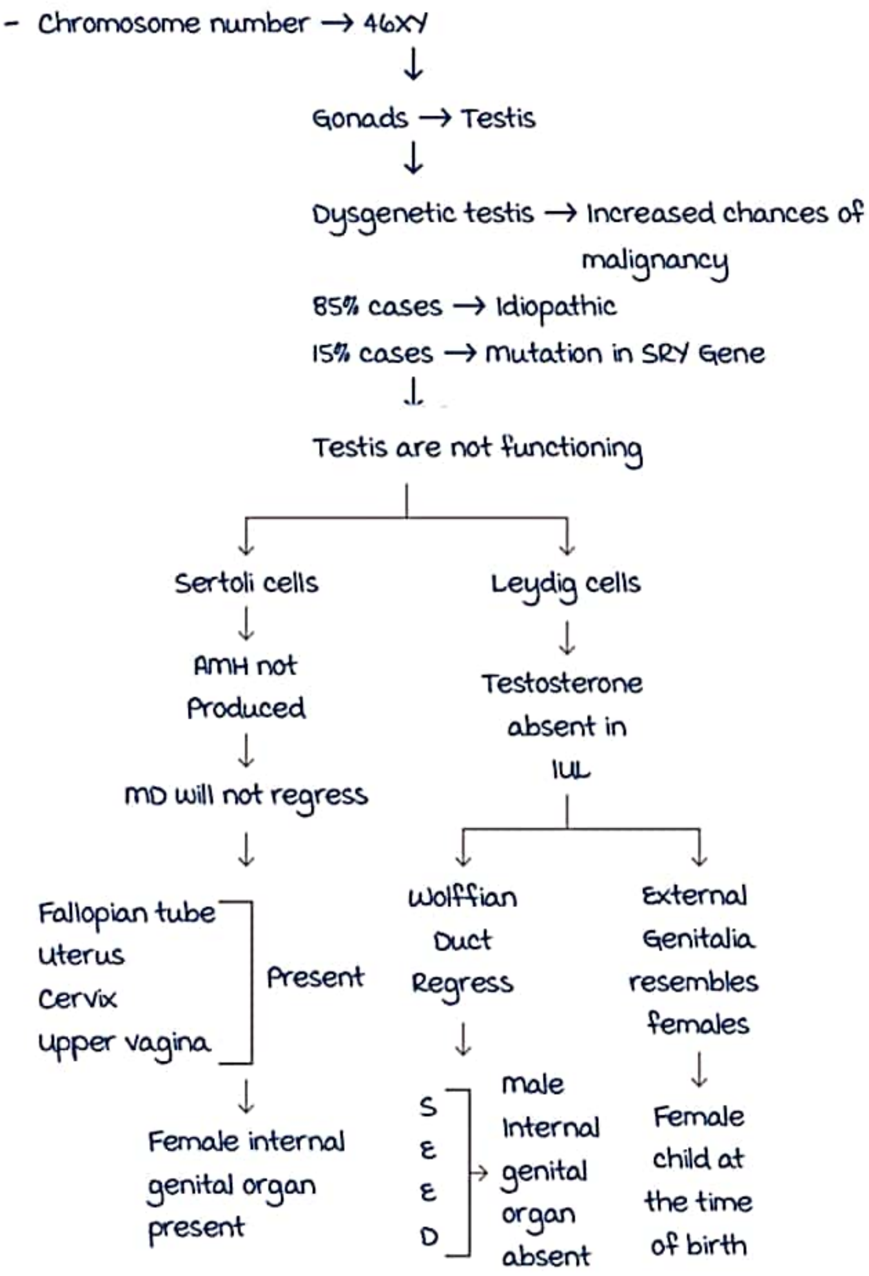
All characters similar to Turner syndrome

Except → 1. Height of the patient is normal
2. Additional features of turners are absent

Management : are same as Turners

Swyer syndrome

01:23:15


- Chromosome number → 46XY
Gonads → Testis
Dysgenetic testis → Increased chances of malignancy
85% cases → Idiopathic
15% cases → mutation in SRY Gene
Testis are not functioning
Sertoli cells
AMH not Produced
MD will not regress
Fallopian tube
Uterus
Cervix
Upper vagina
Present
Female internal genital organ present
Leydig cells
Testosterone absent in IUL
Wolffian Duct Regress
S
E
E
D
male Internal genital organ absent
External Genitalia resembles females
Female child at the time of birth

- At puberty :

Testis will not form testosterone
↓
Estrogen absent
↓
Breast development absent

Adrenal glands will produce insufficient testosterone
↓
Some pubic hair
Some Axillary hair

↓

- Delayed puberty
- Primary amenorrhea

Management :

- Continue to accept them as female
- Gonadectomy as soon as diagnosis is made
- Vaginoplasty
- Estrogen alone for 1 year → Breast development
  ↓
  Followed by Estrogen and Progesterone.

Kallman syndrome :

01:34:20

- Defect in neuronal migration of the neurons which form GnRH from the olfactory placode
- Gene → Kal 1
- Levels of GnRH are decreased + anosmia

↓
↓ LH and ↓ FSH
↓
↓ Estrogen
↓
Secondary sexual characteristics are absent

} Complains of primary amenorrhea or Infertility

- Height is normal

Management : GnRH (Pulsatile)

Example of Hypogonadotropic hypogonadism

Difference between Turner syndrome v/s Kallmann syndrome

01:38:03

Turner Syndrome	Kallmann Syndrome
→ 45 XO	→ 46 XX
→ Streak gonads	→ Gonads → Ovaries → Normal
→ LH and FSH are increased	→ LH and FSH are decreased
→ Short stature	→ Normal stature
→ Additional features : - webbing of neck - cubitus valgus etc	→ Anosmia

SECONDARY AMENORRHOEA

- Amenorrhea for >90 days in a previously normally menstruating woman or <9 cycles in a female with oligomenorrhea
- MC cause of secondary amenorrhoea – Pregnancy
- MC pathological cause of secondary amenorrhoea – PCOS

Causes

↓ Systemic
- Thyroid dysfunction
- ↑ Prolactin levels
- Severe anemia
- Chronic renal failure

↓ HPO axis causes

↑ Prolactin levels / Hyperprolactinemia
↓
–ve feedback on GnRH
↓
↓ LH / FSH
↓
Amenorrhoea
(Cause of lactational amenorrhea)

Prolactin levels

↓ PRL ≥ 50 ng/dl
↓
MRI
↓
rule out prolactinoma

↓ ≤50 ng/dl
↓
Follow up the patient

Prolactinoma

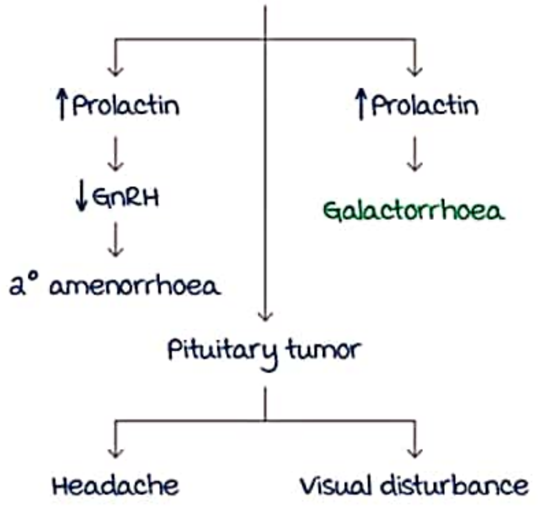
00:04:33

- Prolactin secreting pituitary tumor

↓ microadenoma
<1 cm

↓ macroadenoma
≥1 cm

Clinical features


↑Prolactin
↓GnRH
2° amenorrhoea
↑Prolactin
Galactorrhoea
Pituitary tumor
Headache
Visual disturbance

Diagnosis: MRI

Management
- microadenoma – medical management
  DOC-Cabergoline
- macroadenoma

↓

DOC : Cabergoline

↓

– If size of tumor ≥3cm /
patient not responding

↓

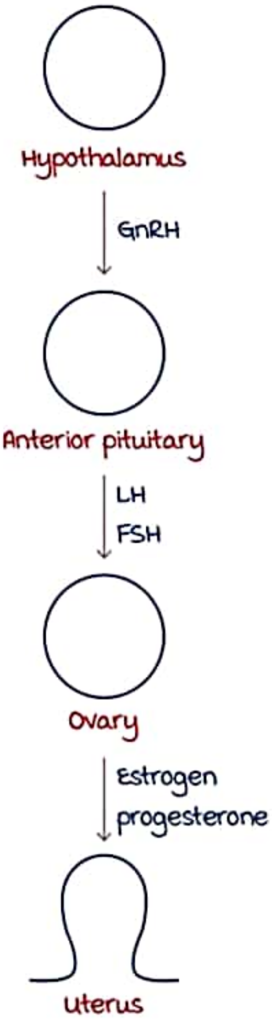
Surgery

Cabergoline 2.5 mg twice weekly

1. DOC for ↑ Prolactin: Cabergoline
2. DOC for ↑ Prolactin in infertile women: Bromocriptine

HPO axis causes of 2° amenorrhoea

00:08:51


Hypothalamus
GnRH
Anterior pituitary
LH
FSH
Ovary
Estrogen
progesterone
Uterus

→ Stress
Anxiety
Excessive physical exercise
Anorexia nervosa
Bulimia nervosa

→ Prolactinoma
Sheehan's syndrome

→ PCOS / Anovulation
Premature menopause
(<40 yrs)

→ Asherman's syndrome
(intrauterine adhesions +
very thin endometrial lining)
MCC – post partum curettage

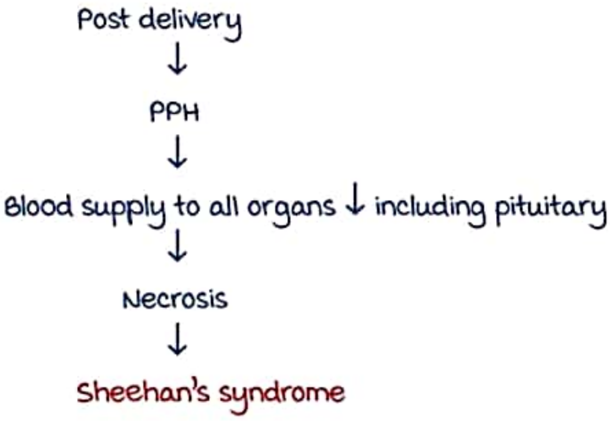
Management of Asherman's
1) Hysteroscopic adhesiolysis
+
Balloon catheter insertion

2) Estrogen + progesterone

Sheehans's syndrome

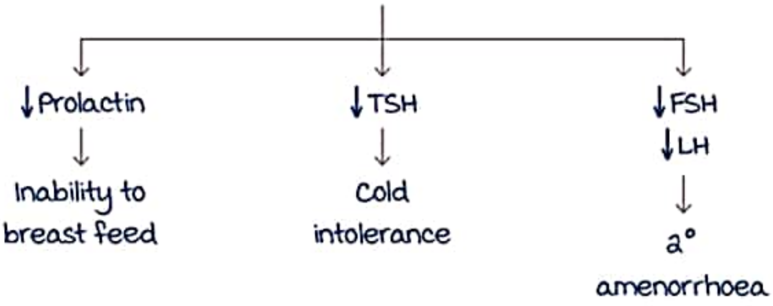
00:14:47

Pituitary gland enlarges during pregnancy by 135%
↓
mainly anterior lobe


Post delivery
PPH
Blood supply to all organs ↓ including pituitary
Necrosis
Sheehan's syndrome

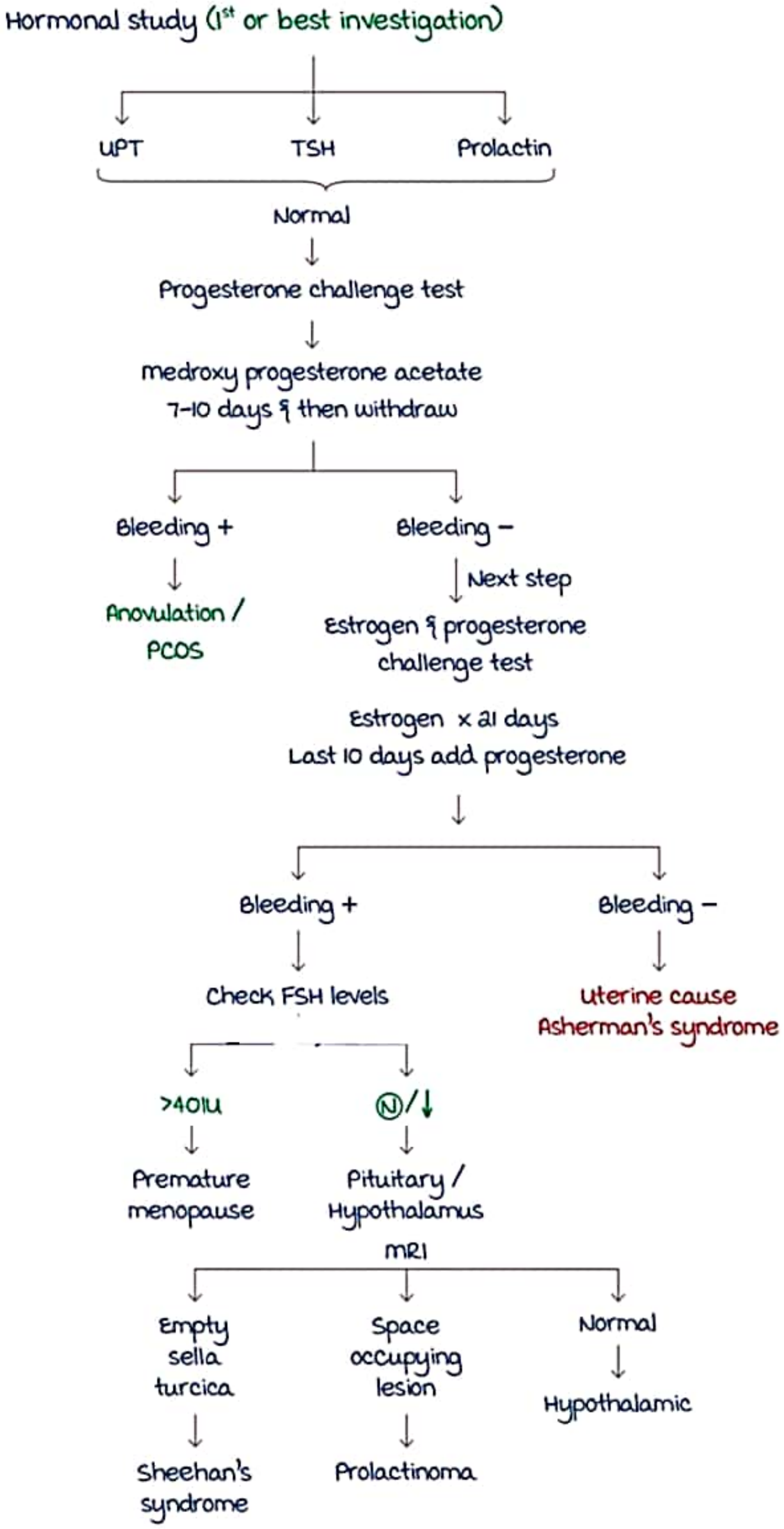
Clinical features

All hormones formed by anterior pituitary ↓


↓Prolactin
Inability to breast feed
↓TSH
Cold intolerance
↓FSH
↓LH
2° amenorrhoea

Work-up for secondary amenorrhea

00:19:18

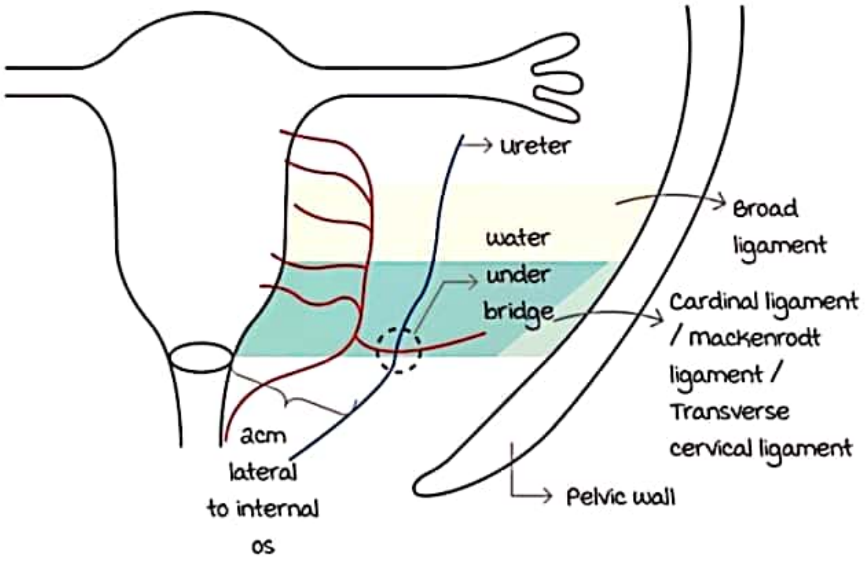

Hormonal study (1st or best investigation)
UPT
TSH
Prolactin
Normal
Progesterone challenge test
medroxy progesterone acetate 7-10 days & then withdraw
Bleeding +
Bleeding −
Anovulation / PCOS
Next step
Estrogen & progesterone challenge test
Estrogen × 21 days
Last 10 days add progesterone
Bleeding +
Bleeding −
Check FSH levels
Uterine cause
Asherman's syndrome
>40IU
Ⓝ/↓
Premature menopause
Pituitary / Hypothalamus
MRI
Empty sella turcica
Space occupying lesion
Normal
Sheehan's syndrome
Prolactinoma
Hypothalamic

Active space

HYSTERECTOMY

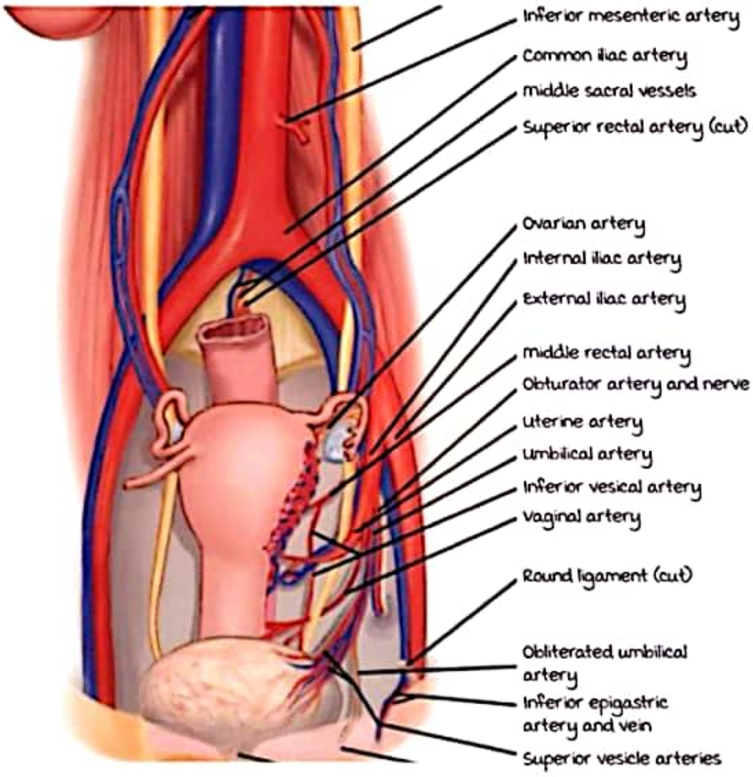
Female genital tract: related antomy

00:00:16


ureter
Broad ligament
water under bridge
Cardinal ligament / mackenrodt ligament / Transverse cervical ligament
acm lateral to internal os
Pelvic wall

- m.c site of ureteric injury during Hysterectomy : Water under Bridge

Course & Relations


Inferior mesenteric artery
Common iliac artery
middle sacral vessels
Superior rectal artery (cut)
Ovarian artery
Internal iliac artery
External iliac artery
middle rectal artery
Obturator artery and nerve
uterine artery
Umbilical artery
Inferior vesical artery
Vaginal artery
Round ligament (cut)
Obliterated umbilical artery
Inferior epigastric artery and vein
Superior vesicle arteries

Piver Rutledge classification

00:04:20

- Types of Hysterectomies and structures removed :

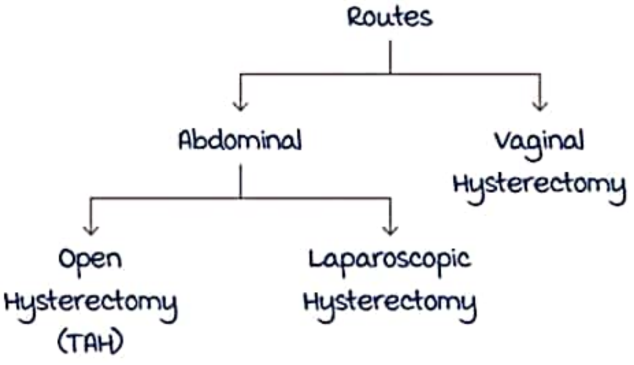
Types of Hysterectomy	Structure Removed
→ Type I Hysterectomy / Simple Hysterectomy / Total Abdominal Hysterectomy (TAH) ↓ MC type of hysterectomy done for benign cause: most common indication ↓ Fibroid	→ Uterus + Cervix → Depending on age of female < 45 ↓ Do not resect ovary ≥ 45 ↓ Resect Ovary ↓ Bilateral Salpingo – oophorectomy (BSO) TAH + BSO A/K/A pan hysterectomy
→ Type II Hysterectomy / Wertheims Hysterectomy / Modified Radical Hysterectomy	→ Uterus + Cervix + both tubes + Both ovaries + 1cm of Vagina + medial half of cardinal ligament + medial half of utero sacral ligament + part of uterine artery
→ Type III Hysterectomy / Radical Hysterectomy	→ Uterus + cervix + both tubes + both ovaries + entire cardinal ligament + entire uterosacral ligament + major part of uterine artery

- m.c site of injury to ureter during hysterectomy: Water under bridge / Where uterine artery crosses over the ureter

- 2nd m.c site: At pelvic brim
- m.c ureteric injury is seen in: Simple Hysterectomy
- maximum risk of ureteric injury is with: Wertheim's Hysterectomy

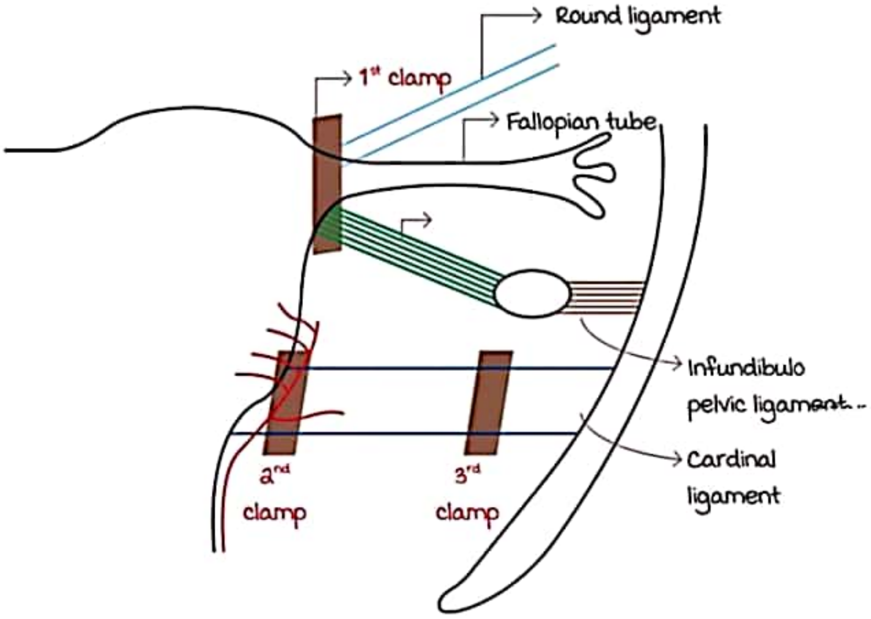
Routes and steps of hysterectomy

00:17:00


Routes
Abdominal
Vaginal Hysterectomy
Open Hysterectomy (TAH)
Laparoscopic Hysterectomy

- Risk for ureteric injury:
  Laparoscopic hysterectomy > Abdominal Hysterectomy > Vaginal Hysterectomy > Caesarean hysterectomy

Steps of Abdominal Hysterectomy:


Round ligament
1st clamp
Fallopian tube
Infundibulo pelvic ligament..
Cardinal ligament
2nd clamp
3rd clamp

Clamps in TAH:

- 1st Clamp : Tubo Ovarian Round Ligament Pedicle
- 2nd Clamp : Uterine Artery
- 3rd Clamp : Cardinal ligament

- 4th Clamp : uterosacral ligament

→ In vaginal Hysterectomy: order of clamp is reversed

- If during hysterectomy ovary is not to be removed → Infundibulo pelvic ligament is not cut

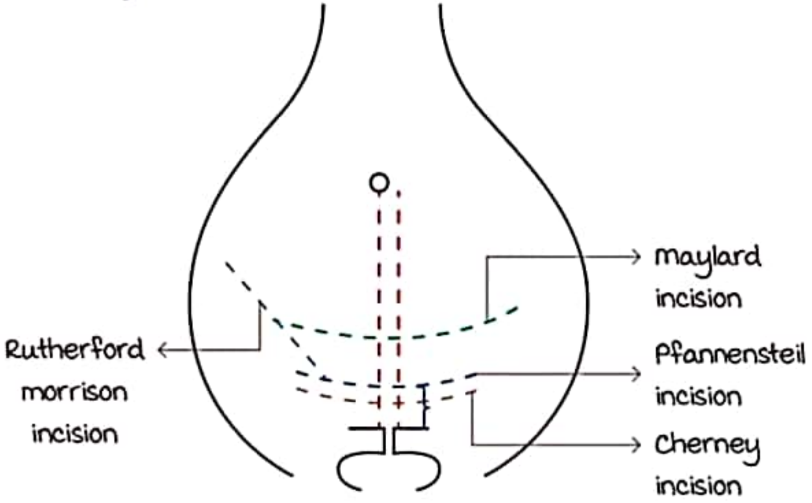
Vaginal hysterectomy 00:25:38

Advantages:

1. No visible Scar
2. Complications – less
3. Hospital stay – less
4. Quickly mobile
   ↓
   Less chance of thromboembolism
5. Early resumption of daily activities
6. Best for obese and elderly female

Disadvantages:

1. Abdominal and pelvic organs cannot be explored
2. Tubo ovarian pathology cannot be dealt with at the same sitting
3. Difficult to perform if size of uterus > 12 weeks pregnant uterus size
4. Difficult to perform if adhesions are present



Maylard incision:

1. Above and parallel to Pfannensteil incision
2. Rectus Abdominus muscle is cut
3. Better visibility to explore pelvic cavity
4. used in gynae – onco surgeries

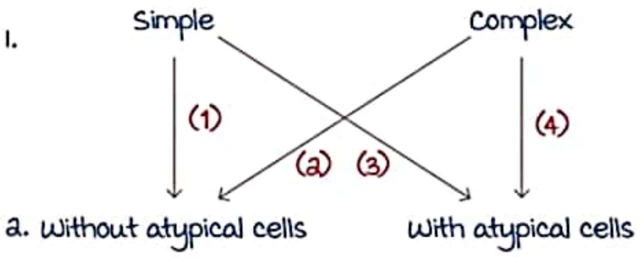
- incision used to access Retro pubic space / Space of Retzius → Cherney incision

ENDOMETRIAL CANCER

ENDOMETRIAL HYPERPLASIA

00:00:33

- Types



		Changes of malignancy
1) Simple Hyperplasia without atypical cells	:	1%
- least chance of malignancy		
- AKA cystic Glandular Hyperplasia		
2) Complex Hyperplasia without atypical cells	:	3%
3) Simple Hyperplasia with atypical cells	:	8%
4) Complex Hyperplasia with atypical cells	:	30%
- Maximum chance of malignancy		

- Due to excessive Estrogen

↓

Proliferates endometrium

↓

Complains of : Excessive bleeding

↓

1st investigation : Trans vaginal sonography (TVS)

↓

Check endometrial thickness

Pre-menopausal	Post menopausal
↓	↓
≥ 12mm	≥ 5mm (FIGO) ≥ 4mm (ACOG)

IOC: Endometrial Aspiration Biopsy

Endometrial biopsy 00:08:27

- Endometrial Aspiration Biopsy
  - OPD procedure
  - Done using pipelle / Vabra Aspirator / Karman's cannula
  - No Anesthesia needed

Pipelle

IOC: Endometrial Aspiration Biopsy

↓

Gold standard Investigation: Fractional Curettage (7 separate samples taken)

VABRA®
DISPOSABLE SET FOR ENDOMETRIAL BIOPSY
FLEXIBLE STRAIGHT CATHETER, BLUNT POINT SIDE-PORTS, TEST-TUBE WITH CAP AND SPOON, UNIVERSAL PIPE-FITTING FOR ASPIRATORS.

2nd Best: Dilatation and curettage

- Endometrial Hyperplasia is a histopathological finding not a clinical diagnosis

Management of endometrial hyperplasia 00:14:34

- Report: Endometrial Hyperplasia is present
- management:

Without atypical cells
→ Simple = 1%
→ Complex = 3%
↓
DOC: Progesterone
↓
medroxy progesterone Acetate (12-14 days in a month)

With atypical cells
→ Simple = 8%
→ Complex = 30%
↓
Total Abdominal Hysterectomy (Best)
±
Bilateral salpingo-oophorectomy
↓ young patient; refuses Hysterectomy
Progesterone = megesterol

Endometrial cancer

00:18:13

- Hyperestrogenic condition

Risk Factors	Protective Factors
1. Nulliparity	1. multiparity
2. Obesity	2. Pregnancy
3. Early menarche	3. Physical exercise
4. Late menopause	4. Smoking
	5. OCPs

- Risk factors for Endometrial cancer:
  - Family History: Hereditary Nonpolyposis colorectal cancer (HNPCC) or Lynch syndrome: Gene mutations of
    1. MLH1 / MSH2 / MSH-6 / EPCAM gene
    2. BRCA 1 / BRCA 2
  - Hypertension
  - Obesity
  - Late menopause, early menarche
  - Diabetes
  - Atypical Endometrial Hyperplasia
  - Unopposed Estrogen
    - → HRT (only Estrogen)
      - → ↑ endometrial cancer not ovarian cancer
    - → PCOS
    - → Estrogen secreting ovarian Tumor
  - Nulliparity
  - Tamoxifen
  - History of infertility
- Obesity + Hypertensive + Diabetic female has ↑ chances of Endometrial cancer → Corpus cancer syndrome
- M.C variety of Endometrial cancer → Adenocarcinoma (Endometroid variety)
- Histopathological Examination:
  1. Back to back arrangement of glands
  2. Desmoplastic stroma

Grading of adenocarcinoma

00:28:59

- Grades

I	→ Well differentiated	→ < 5% undifferentiated cells
II	→ moderately differentiated	→ 5-50% undifferentiated cells
III	→ Poorly differentiated	→ ≥ 50% undifferentiated cells

- most malignant variety of Endometrial cancer
  - → clear cell carcinoma (HPE: Hobnail Nucleus)
  - → 2nd most malignant: Papillary serous Tumor

- All Endometrial cancers can be divided into:

Type I	Type II
→ adenocarcinoma Grade 1 Grade 2	→ Adenocarcinoma Grade III clear cell carcinoma papillary serous tumour
→ Better prognosis	→ Bad prognosis
	→ Not associated with ↑ Estrogen
→ Associated with ↑ Estrogen	→ m.c in thin women
→ m.c in obese women	→ ↑ common in Black
→ ↑ common in white women	→ mutation in P53 gene
→ Associated with mutation in KRAS and PTEN genes	

- P53 → Gate keeper for Endometrial cancer

Important points on Endometrial cancer

- m.c age: 5th – 7th decade
- m.c symptom: Irregular vaginal Bleeding (best)
  2nd best: Post menopausal Bleeding (PMB)
- most specific symptom: Post menopausal Bleeding (PMB)

- Other symptoms:

may be seen

1. Pus in uterus
↓
pyometra

2. Foul smelling watery discharge
↓
Hydrorrhea

3. Pain in abdomen
↓
At same time every day
↓
AKA simson pain

Not seen

→ Loss of appetite
→ weight loss
→ Cachexia

Post menopausal bleeding (PMB) and pyometra 00:38:52

- M.C cause of PMB: Senile Endometrial Atrophy
- M.C cause of PMB in India: Cancer cervix
- M.C cancer causing PMB: Cancer cervix
- % of PMB patients with Endometrial cancer: 10%
- 1st investigation to do in PMB: TVS

↓

Endometrial Thickness

→ Uniformly thick endometrium
ACOG ≥ 4 mm
FIGO ≥ 5 mm
↓
IOC: Endometrial Aspiration Biopsy

→ Endometrium more thick at a particular place

IOC: Hysterescopy and Biopsy

↓

Gold standard: Fractional curettage

Pyometra

- m.c cause of pyometra: Senile Endometritis
- m.c cancer causing pyometra: Endometrial cancer
- m.c cancer causing pyometra in India: Cancer cervix

Screening and staging in endometrial cancer

00:47:43

- m.c route of spread: Direct spread
- m.c site of recurrence: Vagina
- Routine screening is not done
- Screening is done only in HNPCC patients
- Age: 35 years
- Screening method: Fractional curettage (Best)
- Best method to prevent Endometrial carcinoma in patients of HNPCC

↓

→ TAH + BSO after childbearing is complete
→ Not later than 40 years

} Screen for colon cancer by doing colonoscopy (ACOG 2014)

Staging procedure

- Surgical staging:

Biopsy: Endometrial cancer ⊕
↓ mRI
Surgery → TAH + BSO
↓
HPE
↓
Staging
↓
Post operative management

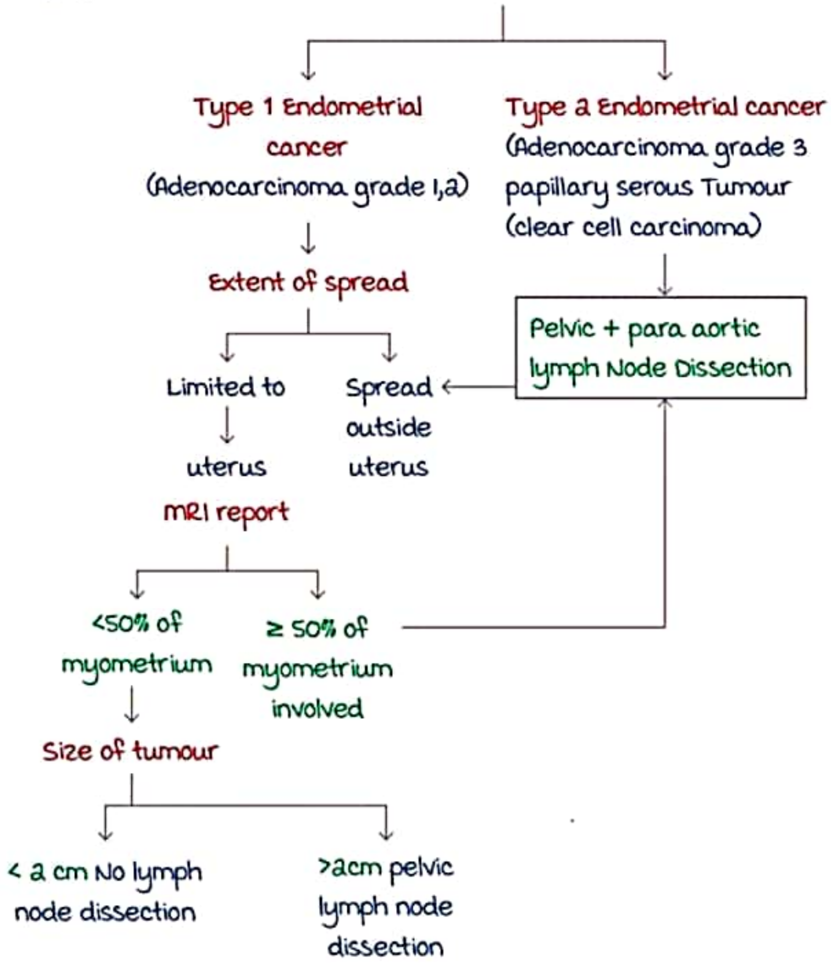
- Steps of surgical staging in Endometrial cancer
  1. mRI → To know extent of myometrial involvement
  2. Surgery → TAH + BSO

- If cervix or any other structure below cervix is involved

↓

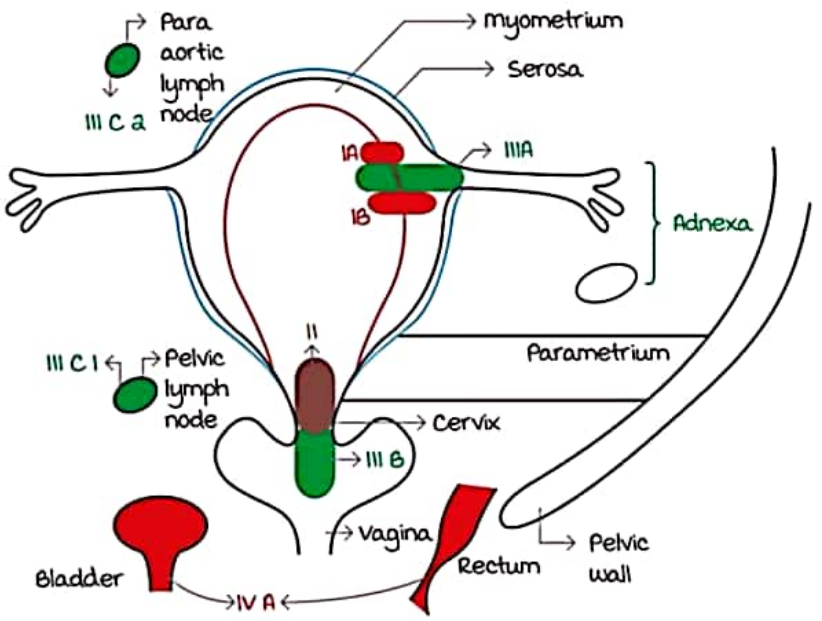
Wertheim's Hysterectomy

3. Lymph Node Dissection


Type 1 Endometrial cancer
(Adenocarcinoma grade 1,2)
Extent of spread
Limited to uterus
MRI report
<50% of myometrium
Size of tumour
< 2 cm No lymph node dissection
>2cm pelvic lymph node dissection
≥ 50% of myometrium involved
Spread outside uterus
Type 2 Endometrial cancer
(Adenocarcinoma grade 3
papillary serous Tumour
(clear cell carcinoma)
Pelvic + para aortic lymph Node Dissection

FIGO staging of endometrial cancer

01:01:25


Para aortic lymph node
III C 2
myometrium
Serosa
IA
IIIA
IB
Adnexa
II
III C 1
Pelvic lymph node
Parametrium
Cervix
III B
Vagina
Bladder
Rectum
Pelvic wall
IV A

Stage I : Cancer limited to uterus

A : < 50% myometrium involved

B : ≥ 50% myometrium involved

Stage II : Cancer spreads to cervix

Stage III : cancer spreads beyond uterus and cervix

A : serosa or Adnexa involved

B : vagina involved

C : LN involved

C_1 : pelvic LN involved

C_2 : Para aortic LN involved

Stage IV : metastasis occurred

A : Regional metastasis = Bladder or Bowel

B : Distant metastasis

Or

Superficial inguinal lymph node involved

Role of MRI:	Role of CT:
1. Extent of myometrium	1. Pelvic spread
2. Lower uterine segment involvement	2. Lymph node involvement
3. Cervix involvement	3. metastasis

Post-operative management

01:12:54

- Management of choice in Endometrial cancer → Radiotherapy
- Exceptions:

1. In stage IA Adeno carcinoma Grade 1, 2: Post operative therapy not needed
2. In stage III and IV: Chemotherapy ± Radiotherapy

Paclitaxel + Carboplatin

Paclitaxel + Doxorubicin + Cisplatin (Tap Regime)

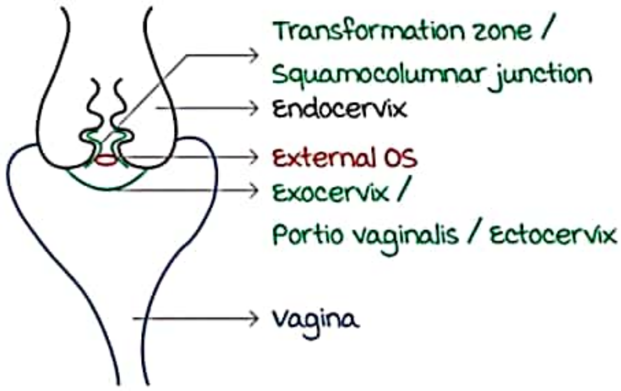
Stage	Staging		Post operative Therapy
	Surgery	LN Dissection	
Stage IA Grade 1,2	TAH + BSO	<2 cm: No LN Dissection ≥ 2 cm: Pelvic LN Dissection	⊖
Stage IA Grade 3 Stage IB	TAH + BSO	Pelvic + Para Aortic LN Dissection	Radiotherapy
Stage II (cervix)	Wertheim's Hysterectomy	Pelvic + para aortic LN Dissection	Radiotherapy
Stage III Stage IV	Debulking surgery	Pelvic and para aortic LN dissection	CT ± Radiotherapy

Active space

CANCER CERVIX

Anatomy of cervix

00:00:30


Transformation zone /
Squamocolumnar junction
Endocervix
External OS
Exocervix /
Portio vaginalis / Ectocervix
Vagina

i) Endocervix

- Lies close to uterus
- Lined by columnar epithelium
- Per speculum examination-appears red in colour

ii) Exocervix

- Part of cervix that lies in vagina
- Lined by stratified squamous epithelium
- Per speculum-appears pink

iii) External OS

- Part where cervix opens into vagina
- Shape
  - Pin point / Circular in Nullipara
  - Transverse / Slit-like in multipapa

iv) Transformation zone

- Squamocolumnar junction
- Columnar epithelium of endocervix converts to squamous epithelium of exocervix
- Dynamic point [Depends on hormonal influence & age of the patient]
- Lies originally at the level of external OS
- Transformation zone moves outward (towards exocervix) under is ↑ hormonal influence [3P's]

Active space

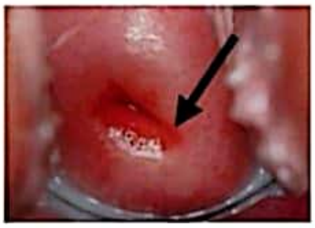
  - Puberty
  - Pregnancy
  - Pills

- moves inwards when there is no hormonal influence
  - menopause
- Classification of transformation zone

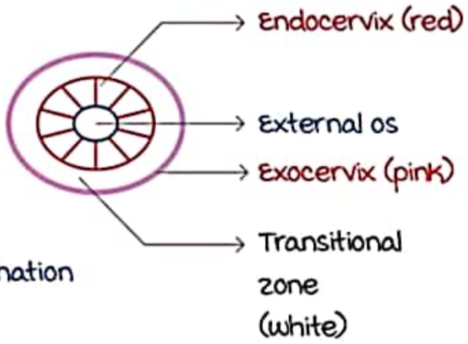
  Type 1 – lies entirely on exocervix [clearly visualized by colposcopy]

  Type 2 – part of it is in endocervix [can still be visualized by colposcopy]

  Type 3 – Entirely inside endocervix [cannot be visualized]
- Per speculum – Appears white (pale)



Cervix Per speculum examination



Cancer cervix – introduction 00:09:47

1. most common cancer of cervix – squamous cell carcinoma
2. most common site for cancer cervix – Transformation zone
3. most common site for adeno carcinoma of cervix – Endocervix
4. Lymphatic Drainage of cervix

   H – Hypogastric Lymph nodes [LN]

   O – Obturator Lymph nodes

   P – Paracervical / ureteric Lymph Nodes

   E – External iliac lymph Nodes

- most common lymph node involved in cancer cervix – obturator LN
- Sentinel LN for cancer cervix – ureteric or paracervical LN
- Superficial inguinal LN
  - Not involved in cancer cervix
  - If involved ⇒ Indicates metastasis [i.e.stage IV-B]

Cancer cervix – pathogenesis & Bethesda classification 00:14:57

1. Pathogenesis of cancer cervix

- metaplasia
  - Conversion of columnar epithelium of endocervix

    ↓

    Squamous epithelium of exocervix
  - metaplasia →
    - Absolutely normal
    - Physiological
    - Seen in all females
    - Not precancerous
- Dysplasia

  In case of cervical infection in females

  ↓ Resolves on its own

  ↓ Persistence of infection

  ↓

  Dysplasia
  - Abnormal
  - Pathological
  - Precancerous

Classification of Dysplasia

CIN – cervical Intraepithelial Neoplasia

CIN 1 – Dysplasia involving $< \frac{1}{3}^{rd}$ of thickness of cervix

CIN 2 – $\frac{1}{3}$ - $\frac{2}{3}^{rd}$ thickness

CIN 3 – $\geq \frac{2}{3}^{rd}$ thickness

Cancer in situ – involves entire thickness of cervix, but overlying membrane is intact

Invasive cancer cervix – overlying membrane is broken

2. Bethesda classification

CIN – 1 – / LSIL [Low squamous Intraepithelial Lesion]

$$\left.\begin{array}{l}\text{CIN – 2}\\ \text{CIN – 3}\\ \text{Cancer in situ}\end{array}\right\} \text{HSIL [High squamous Intraepithelial Lesion]}$$

Note:

Dysplastic cell – ↑ nucleo – cytoplasmic ratio

Cancer cervix – risk factors 00:21:07

- most important – HPV (Human Papilloma Virus) infection
  ↑ chance of HPV infection
  - Intercourse at < 18 yrs of age
  - multiple partners
  - Poor hygiene
  - Low socio-economic status
  - multi parity
- Smoking
- Immunocompromised states
- Oral contraceptive pills → Adenocarcinoma of cervix
- In utero exposure to DES (Diethylstilbestrol)

Note

No role for

- Familial inheritance
- Early menarche & Late menopause

Human Papilloma Virus [HPV] 00:24:28

- Epitheliotropic virus
- Koilocyte

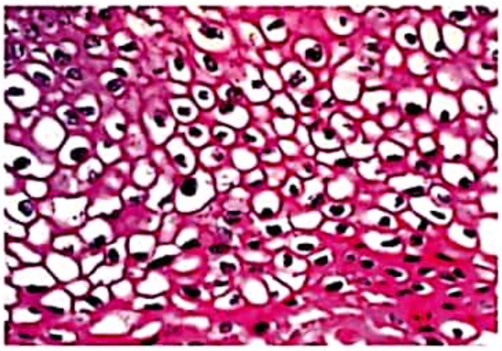
Virus infects epithelium

⇓

Nucleus-pushed towards periphery
& is surrounded by perinuclear halo

⇓

Koilocyte



- Viral proteins – Required
  - To attach virus to epithelium → L_1, L_2
  - For viral replication → E_1, E_2
  - For malignant transformation → E_6, E_7
    - E_6 : Suppresses p53 gene
    - E_7 : Suppresses Retinoblastoma gene

- Diagnosis of HPV – Test for HPV-DNA
  - i) PCR
  - ii) Southern Blot
  - iii) Hybrid capture [Best]
  - Done in females ≥ 30 yrs age

- HPV Subtypes
  - i) Low Risk subtype
    - HPV 6, 11 – Genital warts
  - ii) High risk subtype
    - HPV 16, 18, 31, 33, 35, 39, 45, 52, 58, 59, 68
    - HPV – 16, 18
      - male ⇓ Cancer penis, anus
      - Female ⇓ Cancer cervix, vulva, vagina

- One liners in HPV
  - i) most common HPV associated with cancer cervix – HPV 16
  - ii) most common HPV associated with squamous cell cancer of cervix – HPV 16
  - iii) most specific HPV for cancer cervix – HPV 18
  - iv) most common HPV associated with adenocarcinoma of cervix – HPV – 18

Active space

Human papilloma virus – vaccines

00:31:58

HPV vaccines are made from inactivated capsid proteins

Characteristic	Bivalent	Quadrivalent	9-valent
• Brand	Cervirax	Gardasil	Gardasil-9
• HPV-subtype	16, 18	16, 18, 6, 11	16, 18, 6, 11, 31, 33, 45, 52, 58
• Protects against	CIN, cancer cervix	CIN, cancer cervix, genital warts	CIN, cancer cervix, Epithelial cancer of vulva and vagina
• Dose	0.5ml, contains – HPV 16= 20 mcg – HPV 18 = 20 mcg	0.5ml, contains – HPV 16 = 40 mcg – HPV 18 = 20 mcg – HPV 6 = 20 mcg – HPV 11 = 40 mcg	0.5 ml
• Dosage schedule	0, 1, 6 months	0, 2, 6 months	0, 2, 6 months
• Route	I.m (Intra muscular)	I.m	I.m
• Administered to	Girls	Girls & Boys	Girls & Boys
• Adjuvant	Aluminium sulphate [Adjuvant system 04]	Alum	Alum

1 Single-dose 0.5 mL Vial
GARDASIL
(Quadrivalent Human Papillomavirus (Types 6, 11, 16, 18) Recombinant Vaccine)
Suspension for Intramuscular Injection
GARDASIL

One liners in HPV vaccine:

- Age of vaccine administration
  - 9-26 yrs
  - Ideal age is 11-12 yrs
- most common complication – syncope

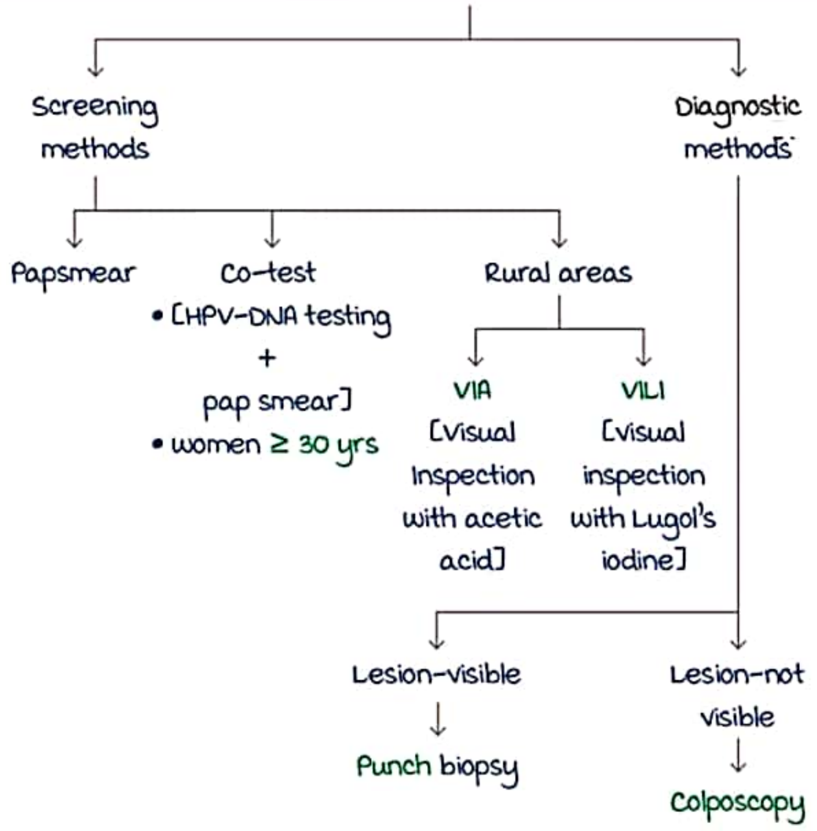
- Contraindication
  - Pregnancy
  - Age < 9 yrs
  - Hypersensitivity

One liner in HPV infection

- most common age group for HPV infection → 20-24 yrs
- most common sexually Transmitted Disease (STD) in USA → HPV
- most common age – CIN → 20-29 yrs
  - Cancer insitu → 30-35 yrs
  - Cancer cervix → 35-39 yrs & 55-60 yrs- Bimodaldistribution

Diagnosis of cancer cervix and cervical intraepithelial neoplasia

00:37:59


Screening methods
Diagnostic methods
Papsmear
Co-test
• [HPV-DNA testing + pap smear]
• women ≥ 30 yrs
Rural areas
VIA [Visual Inspection with acetic acid]
VILI [Visual inspection with Lugol's iodine]
Lesion-visible
Punch biopsy
Lesion-not visible
Colposcopy

Papsmear

00:42:00

Screening is universal for cancer cervix

Pap Test

Age to start: 21 years irrespective of 1st intercourse

- method of pap smear

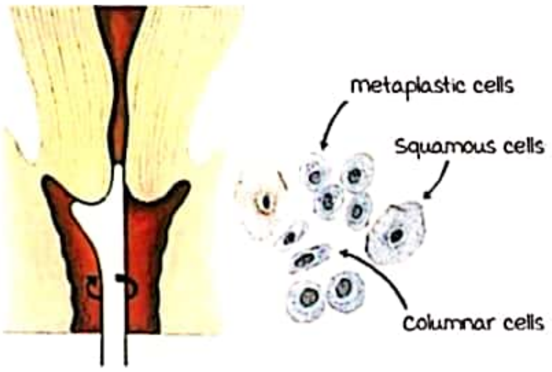
  i) Instrument used – Ayer's spatula, Endocervical brush

Ayer's spatula

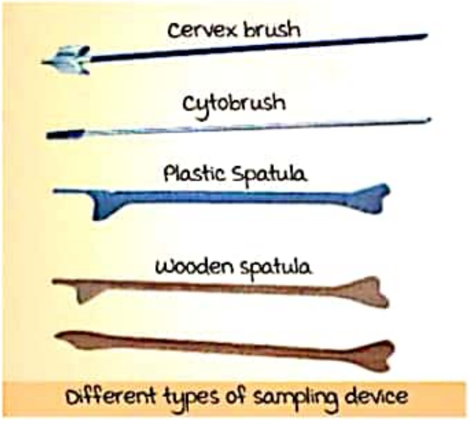
Endocervical brush

ii) Sample site

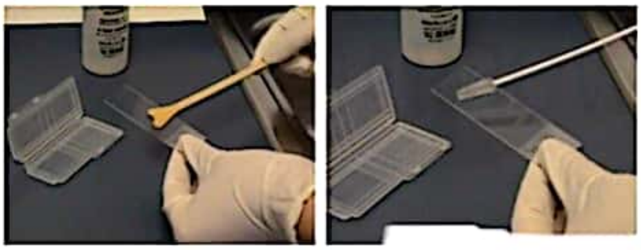
- Slide 1 – The concave end of Ayer's spatula is rotated 360° in the transformation zone [near external OS] and sample is taken – To detect squamous cell cancer
- Slide 2 – The endocervical brush is rotated in endocervix and sample taken
  - To detect adenocarcinoma
- Slide 3 – Control slide
  - The other end of Ayer's spatula is taken to rotate in posterior wall of vagina and sample taken


metaplastic cells
Squamous cells
Columnar cells

Ayer's spatula – transformation zone


Cervex brush
Cytobrush
Plastic Spatula
Wooden spatula

Different types of sampling device



Slides of Pap smear

A. Sample site for cytology (Pap smear) – Posterior wall of vagina

B. Sample site for Hormonal study – Lateral wall of vagina

iii) Fixative – 95% Ethyl alcohol

- Liquid Based cytology

i) Instrument – Cervical brush

ii) Fixative – methanol

iii) No slide preparation done

- Guidelines for Pap smear

Pap smear was 1st performed by Georgios Papanikolaou

i) Start pap smear – At 21 years of age
⇓
Repeat every 3 years
⇓
Till woman becomes 29 years of age
⇓
From 30-65 yrs of age
– Pap smear & HPV DNA testing (Co-test) done every 5 years
(or)
– Continue Pap smear, every 3 year

ii) Stop pap smear – At 65 years

Criteria to stop →

- 2 cotest / 3 pap test – Normal for past 10 years consecutively
- Hysterectomy done for a benign cause

iii) HIV positive female

- Annual screening
- Uncertain to stop screening at 65 years

iv) Female treated for CIN-2, 3 & cancer in situ or cancer cervix
⇓
Continue screening for 20 years (at least)

v) If a female has taken HPV vaccine
⇓
Continue screening as usual

Rural areas – screening methods 00:53:55

	Dysplasia ⊕	Dysplasia ⊖ [Normal epithelium]
VIA[5% acetic acid]	white colour (stained)	Pink colour [unstained-Normal in appearance]
VILI[3-5% Lugol's iodine]	unstained [glycogen-used up]	Brown / mahogany colour [stained]

Report & action of pap smear

00:57:05

Report – 1

- Normal report

  ⇓

  Continue screening

Report – 2

- Unsatisfactory test

  ⇓

  Repeat pap test after 2-4 months

Report – 3

- Infection ⊕

  ⇓

  Antibiotics given, Repeat pap test after 2-4 months

Infection

- Pap-can detect
  - i) Human papilloma virus
  - ii) Bacterial vaginosis
  - iii) Herpes simplex virus
  - iv) Trichomonas
  - v) Candidia
- Pap-cannot detect
  - i) Chlamydia
  - ii) Gonorrhea

Report 4

- ASCUS [Atypical Squamous Cell of Unknown Significance]

  ⇓

  5-10% chance in conversion of ASCUS to CIN -2, 3

ASCUS

- Age 21-24 yrs ⇓ Repeat pap smear ⇓ Abnormal ⇓ Colposcopy
- Age ≥ 25 yrs ⇓ Reflex HPV-DNA testing
  - + ⇓ Colposcopy
  - – ⇓ Co testing (after 3 yrs)

Report-5

- LSIL

Growth-visible ⇓ Punch Biopsy

Growth – not visible ⇓ Colposcopy [colposcopy guided Biopsy] +/- Endocervical curettage / Sampling

[incase of HSIL, Growth-not visible → Endocervical sampling is a must]

Special situation

- LSIL: Female (21-24 years)

  ⇓

  Follow up with cytology [colposcopy-contraindicated]

- LSIL in post menopausal woman

  ⇓

  - Repeat pap in 6-12 months $\xrightarrow{\text{If positive}}$ Colposcopy
  - HPV – DNA test $\xrightarrow{\text{If positive}}$ Colposcopy
  - Colposcopy

- LSIL in pregnant female

  ⇓

  Wait for 6 weeks after delivery before performing any further testing

- In HSIL

  All cases are followed up with colposcopy & biopsy

Other reports and actions of PAP smear 01:09:03

Case scenario:

Pap smear – Normal, HPV-DNA-positive

⇓

Repeat co-testing in 12 months

⇓

⇓

If HPV-DNA test persists

⇓

Colposcopy

Report – 6

- ASC-H [Atypical squamous cells, HPE-cannot exclude HSIL]

⇓

25% chance of conversion of ASCUS to CIN-2, 3

ASCUS

⇓

Colposcopy done, irrespective of age (or) HPV-DNA testing

Report – 7

- HSIL
  - Lesion-visible

    ⇓

    Punch biopsy
  - Lesion – Not visible

    ⇓

    - Colposcopy + (Best) Endocervical curettage
    - Alternative – Visualise & LEEP [Loop Electro Excisional Procedure]

Report – 8

- Atypical glandular cells

⇓

Suggests- Endometrial cancer (or) Cancer cervix

⇓ ⇓

Test done – Endometrial Biopsy + Colposcopy & Endocervical curettage

Active space

MANAGEMENT OF CANCER CERVIX

Diagnosis of cervical intraepithelial neoplasia (CIN) 00:00:07

1. Colposcopy
   - magnifying instrument

↓ minimum magnification (5x) ↓ maximum magnification (20x)

- OPD procedure
- No anaesthesia
- Sensitivity – 50-80%
- Colposcopy – Gold standard [To Evaluate Abnormal Cervical Cytology]

Procedure of colposcopy

1) Biopsy from a rough area

↓

Apply 3-5% acetic acid

↓ Dysplastic area → Appears white (Aceto – white)

↓ Normal → Appears Pink

↓ Metaplasia → Appears grey

↓

② Biopsy from aceto – white area

③ Biopsy from area with abnormal blood vessels

⇓

blood vessels such as – mosaic
- Comma shaped
- Reticular
- Punctate

Disadvantage of Colposcopy

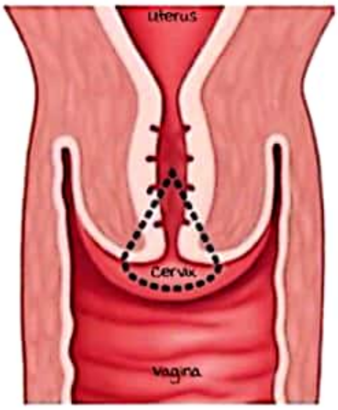
- upper 2/3rd of endocervix cannot be visualised

Case Scenario

Pap smear- High-grade squamous intraepithelial lesion (HSIL)
Colposcopy - Normal

Earlier - Cone Biopsy
Now - Endocervical sampling/curettage

- Since, it can be a case of dysplasia in endocervix



2. Cone Biopsy

- OT procedure
- Under General Anaesthesia (GA)
- Biopsy must include
  - Endocervix
  - Exocervix
  - Transformation zone

- Complication of cone biopsy
  - Bleeding
  - Injury to internal OS

    ⇓

    2nd trimester recurrent abortions

- Indications for Cone Biopsy [Conization]

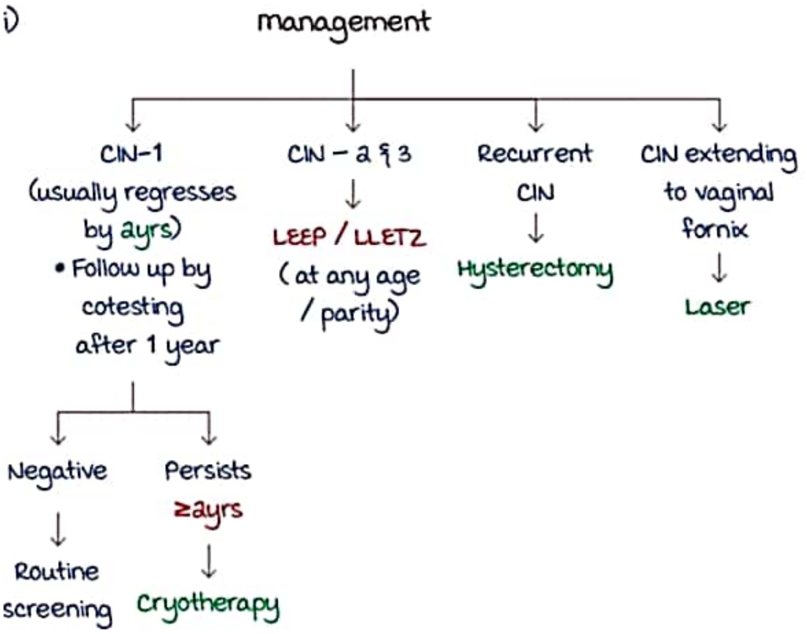
Diagnostic
- Transformation zone in endocervix (or) Transformation zone – not completely visible
- Unsatisfactory colposcopy [Limit of lesion – not visible]
- Suspecting Adenocarcinoma / Adenocarcinoma insitu
- Endocervical curettage – positive

Therapeutic
- Cancer insitu (or) Stage IA, of cancer cervix in young Female

Active space

Management of cervical intraepithelial neoplasia 00:11:17

i)


management
CIN-1
(usually regresses by 2yrs)
• Follow up by cotesting after 1 year
Negative
Routine screening
Persists ≥2yrs
Cryotherapy
CIN – 2 & 3
LEEP / LLETZ
(at any age / parity)
Recurrent CIN
Hysterectomy
CIN extending to vaginal fornix
Laser

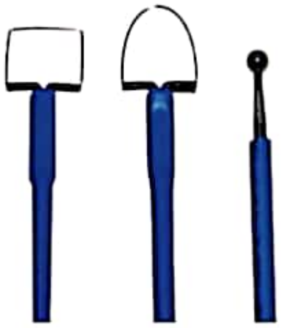
Note:

- CIN – 1 in 21 – 24 years of age
  ⇓
  Follow up even if it persists
- Hysterectomy is not done to manage CIN- 2 & 3 in any age/ parity

ii) LEEP/LLETZ

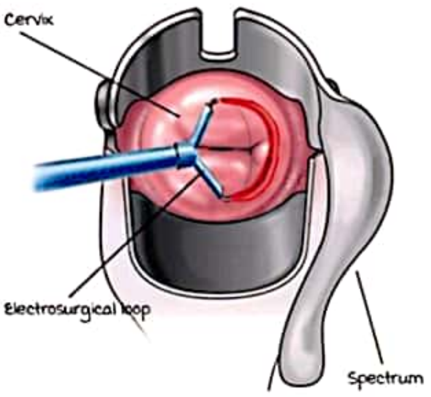
LEEP – Loop Electrosurgical Excision procedure

LLETZ – Large loop Excision of Transformation zone



- OPD procedure
- Under LA (local anaesthesia)
- No Admission required
- Cuts & coagulates at same time

- Tissue can be removed upto a depth of 10mm

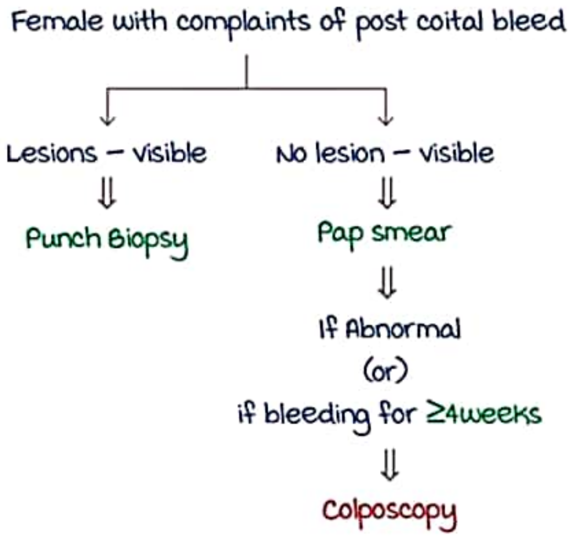

Cervix
Electrosurgical loop
Spectrum

Cancer cervix

00:17:43

- most common gynaecological cancer in world
- 2nd most common cancer seen in female worldwide [most common – Breast cancer]
- most common type of cancer cervix – squamous cell carcinoma
- most common site of cancer cervix – Transitional zone
- most common site of adenocarcinoma cervix – endocervix
- most common symptom – Irregular bleeding > post – coital bleed / Contact bleed
- most specific symptom – post coital bleed

Case scenario



Female with complaints of post coital bleed

Lesions – visible ⇓ Punch Biopsy

No lesion – visible ⇓ Pap smear ⇓ If Abnormal (or) if bleeding for ≥4weeks ⇓ Colposcopy

Cancer cervix

- most common route of spread – lymphatic spread
- most common site of metastasis – lymph node
- most common site of hematogenous spread – Lungs
- most common cause of death in cancer cervix – uremia / Renal failure
- 2nd most common cause of death in cancer cervix – Hemorrhage

Cancer cervix – staging

00:28:40

- Based on clinical staging
- Investigation → Staging of cancer → Surgery

- Investigations recommended by FIGO- 2018
  [Earlier not recommended by FIGO]
  - Ultrasound (USG)
  - MRI (Magnetic Resonance Imaging)
  - CT (Computed Tomography)
  - PET scan (Positron Emission Tomography)

- Best investigation for Radiological assessment of tumor ≥ 1cm size
  ⇓
  MRI

- Best investigation for nodal metastasis → PET scan
- Suspected bladder/bowel involvement should be confirmed by Biopsy
  ⇓
  Bullous edema of Bladder / Bowel does not confirm stage – IV

- Cystoscopy / Sigmoidoscopy – Indications
  i) Patients with related symptoms
  ii) Barrel shaped growth on endocervix extending to anterior vaginal wall [may involve bladder]

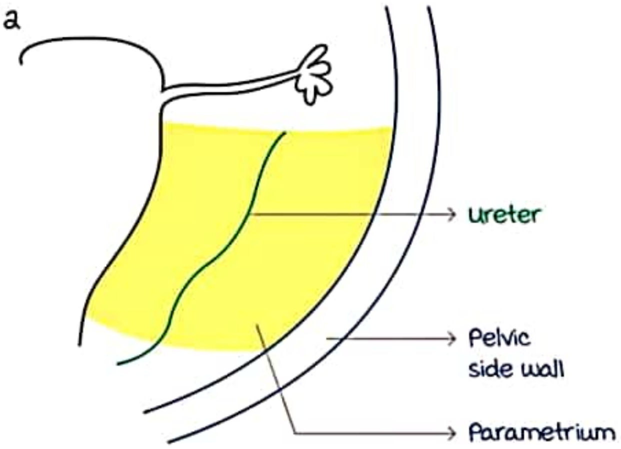
New figo staging of cancer cervix 00:34:21

Stage 1
- Cancer limited to cervix
- Extension to uterus is disregarded

- Stage 1A
  - Microinvasive
  - Depth of invasion < 5mm
  - 1A
    - A_1 Depth<3mm
    - A_2 Depth = 3-4mm
- Stage 1B – Invasive
  - Depth of invasion ≥5mm
  - 1B
    - B_1 <2cm
    - B_2 ≥2cm
    - B_3 ≥4cm

Active space

Stage – 2



- Upper 2/3rd of vagina involved
- Stage 2
  - A: No parametrium involvement
  - B: Parametrium involved
- Stage 2A
  - $2A_1$: Size <4cms
  - $2A_2$: Size $\geq$ 4cms

Stage – 3

- Lower 1/3rd of vagina involved
- Stage 3
  - 3A
    - Pelvic sidewall not involved
  - 3B
    - Pelvic side wall involved (or) Hydroureter / Hydronephrosis
  - 3C
    - Lymph node involved
      - $3C_1$: Pelvic lymph node
      - $3C_2$: Para-aortic lymph node

Active spa

Stage – 4

- Metastasis
- Stage 4

4A
- Regional metastasis to bowel / Bladder

4B
- Distant metastasis (or) superficial inguinal lymph nodes- involved

Management of cancer cervix – principles 00:44:08

a. Radiotherapy can be used in all stages of cancer cervix[stage I-IV]

b. Radiosensitizer → ↑ sensitivity of squamous cells to radiotherapy
- Radiosensitzer used in cancer cervix → Cisplatin
  [Cancer cervix → Chemoradiation]

c. Cancer cervix rarely involves ovaries
∴ In young females → Ovaries are not removed (in surgical management of cancer cervix)

d. Stage [IA$_1$- IIA$_1$] → Surgery
Stage [IB$_3$ & IIA$_2$] → Chemoradiation
(Because surgery is not preferred for tumor size ≥ 4cm
Stage [IIB- IV] → Chemoradiation

Management of cancer cervix- operative management 00:50:48

Stage	Young	Old	Lymph node Dissection
Stage IA$_1$	• Conization	• Type I / Total abdominal Hysterectomy	Pelvic Lymph Node Dissection
Stage IA$_2$	• Conization / Radical Trachelectomy	• Type II (Werthem's) / modified Radical Hysterectomy	
Stage IB$_1$	• Radical Trachelectomy	• Type III / Radical Hysterectomy	
Stage IB$_2$	• Type III Hysterectomy	• Type III / Radical Hysterectomy	
Stage IIA$_1$	• Size <2cm – Radical Trachelectomy • Size >2cm – Type III Hysterectomy	• Type III / Radical Hysterectomy	

Note:

i) Radical Trachelectomy

- Removal of cervix + parametrium & anastomosis of uterus & vagina
- Done only if size of tumor ≤2cms
- mode of delivery in a woman post- radical trachelectomy → Cesarean section

Post operative management of cancer cervix 00:57:09

Risk factors

- Intermediate Risk factors
  3s's
  - Size ≥4cms
  - Stromal invasion present
  - Lymph vascular Space involved
- High Risk factors
  3P's
  - Positive nodes
  - Positive margins
  - Parametrial involvement

Stage IA_1 - No post operative management

All stages except IA_1

- No risk factors ⇓ No post – operative management
- Intermediate Risk ⇓ PORT [post-Operative Radiotherapy] ⇓ EBRT= 45-60gy [External Beam Radiotherapy]
- High Risk ⇓ Chemoradiation [Cisplatin]

Stage IIB –IV }
Stage IB3 & IIA2 } Chemoradiation

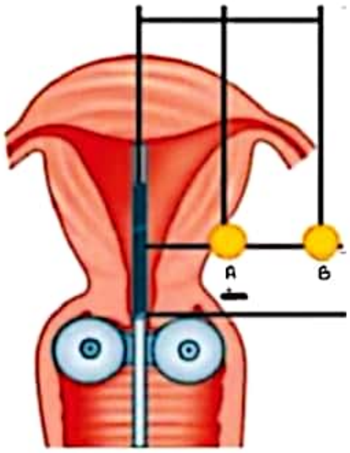
Radiotherapy in cancer cervix

- Brachytherapy
  (or)
  ICRT
  [Intracavitory Radiotherapy]
- ERBT

Brachytherapy (intra-cavitory)

- Isotope
  - Low – dose – cesium 137
  - High – dose – Iridium 192
- 2 reference points

	Point A	Point B
- Location	2cm above & 2cm lateral to external os	2cm above & 5cm lateral to external os
- Structures present	Paracervical / parametrial lymph nodes	Obturator lymph nodes
- Dose	80gy	60gy



CANCER OVARY - 1

Functional ovarian cyst 00:01:42

Ovarian tumour / Adnexal mass:
- Functional ovarian cyst
- Benign tumour
- Borderline tumour
- Malignant tumour

Functional ovarian cyst:

Related to temporary hormonal disturbances

- M.C → Follicular cyst
  [Cyst → Follicle ≥ 3 cms]
- M.C cyst to rupture → Corpus luteal cyst
- Theca lutein cysts: due to ↑ hCG
  Causes: molar pregnancy
    - Twin pregnancy
    - Treatment for infertility → Ovulation induction with hCG/ Clomiphene/hMG

Most functional cyst → Not more than 5-7 cms regress spontaneously

Benign vs malignant tumours 00:06:31

Benign	Malignant
• M.C in female of reproductive age	Extremes of age → Young (adolescent) → Old
• Usually U/L	B/L
• Pain present	Initially: No pain
• Cystic consistency	Variable consistency (Cystic + solid)

IOC : TVS > TAS

Active space

High risk features of malignancy on USG

1. Bilateral
2. Solid mass / multilocular cysts
3. Thick (≥3 mm) septa
4. Papillary excrescences on the surface
5. Ascites
6. Presence of matted bowel loops & enlarged nodes

Risk of malignancy index (RMI) :

(Ultrasound score) × (menopausal status) × (Ca 125 levels)

↓

USG score – check

B – B/L
A – Ascites
M – Malignancy / metastases
S – Solid areas

Score ≥ 200 → High risk of malignancy

Management of adnexal mass 00:14:07

Indications for surgery on adnexal mass:

1. Any ovarian mass showing high risk features on USG
2. Size: Ovarian mass > 7 cms
   Adnexal mass > 10 cms
3. Raised CA 125 in post menopausal females (≥ 35 IU)
4. Acute complication of cyst → Torsion (M.C – dermoid cyst)
5. For diagnostic purpose

↑ CA – 125 in reproductive age females:

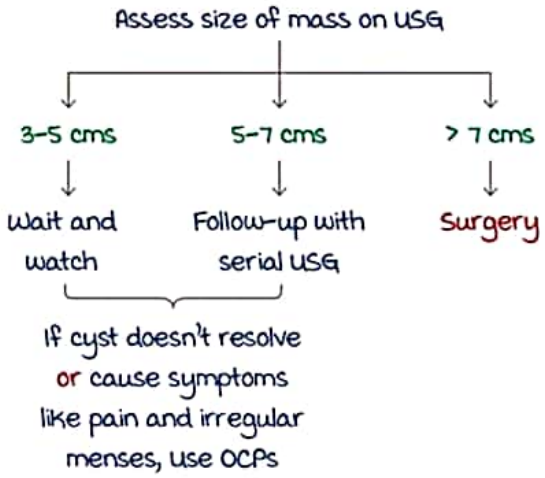
- Not of diagnostic value
- ↑ in: Endometriosis
  Fibroid
  PID

Active space

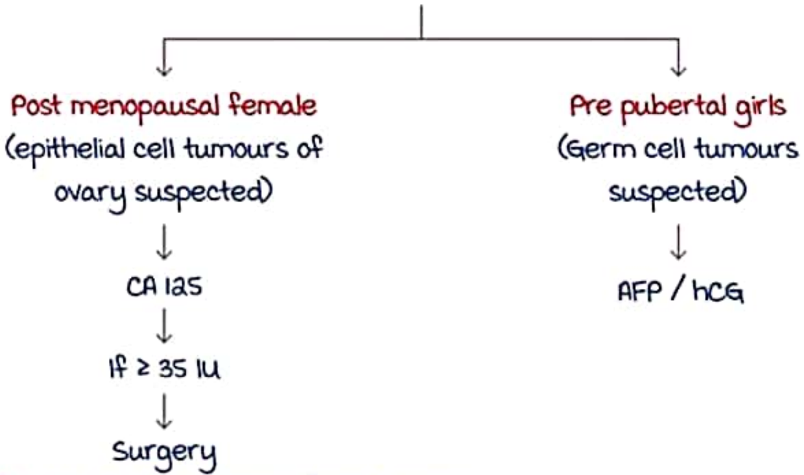
Benign mass 00:19:12

Case 1: In reproductive age

No need for CA-125 levels


Assess size of mass on USG
3-5 cms
5-7 cms
> 7 cms
Wait and watch
Follow-up with serial USG
Surgery
If cyst doesn't resolve or cause symptoms like pain and irregular menses, use OCPs

Case 2: In extremes of age


Post menopausal female
(epithelial cell tumours of ovary suspected)
CA 125
If ≥ 35 IU
Surgery
Pre pubertal girls
(Germ cell tumours suspected)
AFP / hCG

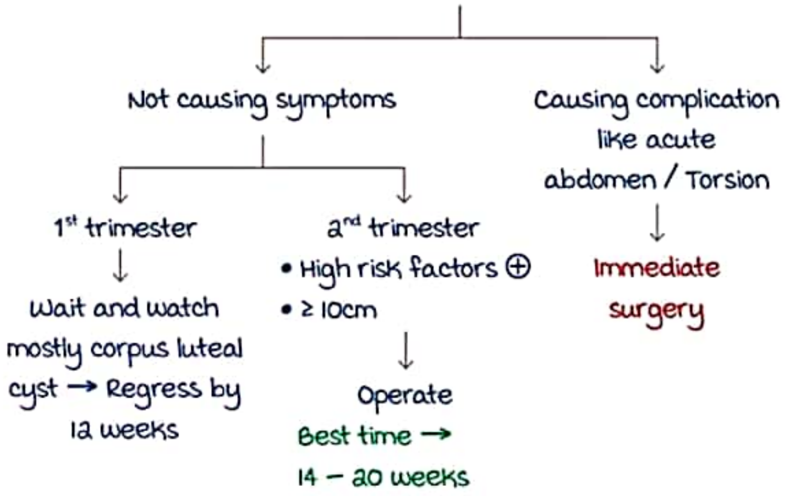
Note: CA 125 levels in reproductive age :

- Not of much use
- ↑ in benign conditions like endometriosis, Fibroid, PID, Genital TB

Significant if ≥ 200 IU

Adnexal mass in pregnancy

00:24:50


Not causing symptoms
1st trimester
Wait and watch mostly corpus luteal cyst → Regress by 12 weeks
2nd trimester
• High risk factors ⊕
• ≥ 10cm
Operate
Best time → 14 – 20 weeks
Causing complication like acute abdomen / Torsion
Immediate surgery

Active space

Note:

M.C ovarian cyst diagnosed in pregnancy: Dermoid cyst

M.C ovarian cyst to undergo torsion in pregnancy: Dermoid cyst

M.C time for ovarian cyst to undergo torsion

- End of 1st trimester / Puerperium

% of ovarian mass to undergo malignant transformation

↓

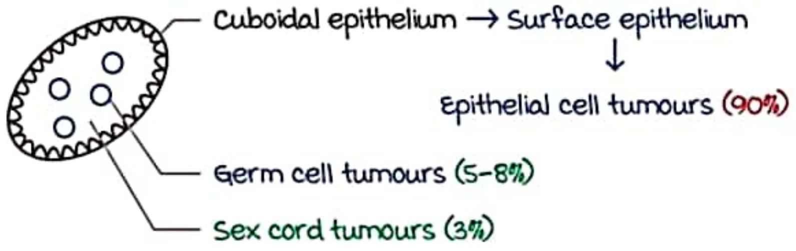
Post-menopausal women – 30%

Pre-menopausal women – 7%

Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Classification of ovarian tumours

00:31:47


Cuboidal epithelium → Surface epithelium
↓
Epithelial cell tumours (90%)
Germ cell tumours (5-8%)
Sex cord tumours (3%)

Metastatic tumours of ovary → Least common

	Epithelial cell tumour	Germ cell tumour (GCT)	Sex cord tumours
1. Incidence	M.C tumour (90%)	5 -8 %	3%
2. Types	Serous (75 – 80 %) (m.c) Endometroid (8 – 10%) Mucinous (5%) Clear cell (5%) Brenner tumour (least common)	Thank: Teratoma mature → Benign (Dermoid cyst) Immature → malignant YOU: Yolk sac tumour aka Endodermal sinus tumour C: Choriocarcinoma D: Dysgerminoma E: Embryonal tumours	• Hormone secreting tumours of ovary I. Estrogen secreting tumours (Feminizing tumours) Granulosa cell tumours Fibroma Thecoma II. Androgen secreting tumours (virilizing tumours) Sertoli cell tumours Leydig cell tumours Hilus cell tumours (Hilus cell present in medulla of ovary) III. Gynandroblastoma secrete estrogen + androgen
3. m.c benign variety	Serous cystadenoma	Dermoid cyst (Immature cystic teratoma) [m.c benign tumour of ovary over all]	

Active space

	Epithelial cell tumours		GCT		Sex cord tumours	
4. m.c malignant variety	Serous cystadeno Ca (m.c malignant ovarian tumour overall)		mature teratoma [Earlier → Dysgerminoma]			
5. Age	Elderly female (m.c → 60- 70years)		Young female (10 – 20years) In 10-20 years: 70% of ovarian tumours are GCT		mostly perimenopausal [can be seen at any age]	
6. UL/BL	mostly B/L		mostly U/L		mostly U/L	
	Tumour	% B/L	Tumour	% B/L	Tumour	B/L
	Serous cystadenoma	15 – 20%	Dermoid cyst	10%	Granulosa cell tumour	≤ 2%
	Mucinous cystadenoma	10%	Dysgerminoma	15 – 20%		
	Serous cystadeno Ca	≥ 50%	Endodermal sinus tumour → 100% U/L			
	Endometroid	40%	∴ biopsy of opposite ovary → Contraindicated			
	Brenner's tumour → mostly U/L					

	Epithelial cell tumours	Germ cell tumours	Sex cord tumors
7. Growth of tumours	slow growing tumors	Rapidly growing (most rapid → Yolk sac tumor)	
8. Symptoms	Non – specific symptoms → Nausea vomiting resembling irritable bowel syndrome Mucinous: Pseudomyxoma Peritonii Brenner's: Pseudomeig syndrome	present with subacute pain in abdomen • Produce hcg ↓ precocious puberty	Granulosa cell tumours: Secrete estrogen → Precocious puberty → menometrorrhagia → Post menopausal bleeding Androgen secreting tumours – virilisation Fibroma → meig syndrome
9. Prognosis	Bad prognosis	Better prognosis GCT with best prognosis: Dysgerminoma (Highly radio & chemo sensitive) GCT with worst prognosis: Yolk sac tumours	Best prognosis

Active space

	Epithelial cell tumours	Germ cell tumours (GCT)	Sex cord tumours
10. malignant potential	Serous variety: Benign → 65% malignant → 35 – 40% mucinous → 20% Brenner → mostly benign Clear cell tumour: High grade malignant tumour Endometroid : Low malignant potential Associated with endometriosis m.C malignant → Endometrial carcinoma	m.C malignant GCT : Immature teratoma > Dysgerminoma most malignant : Yolk sac tumour Note: Dermoid cyst malignant in <2% cases – m.C malignant : Squamous cell Ca	Granulosa cell tumours • Low grade malignancy • 25 – 50% → Endometrial hyperplasia • 5% associated with endometrial carcinoma

	Epithelial cell tumours	GCT	Sex cord tumours
II. Route of spread	m.C → Transcoelomic / Transperitoneal ↓ If malignant ascites ⊕ → Stage III C If pleural effusion ⊕ → Stage IV A 2nd m.C → Lymphatic spread pelvic nodes: Stage II B Retroperitoneal nodes: stage III A, Inguinal nodes: Stage IV B 3rd m.C → Hematogenous If liver and spleen involved: Capsule → Stage III B / III C Parenchyma → Stage IV B	Transcoelomic Note: Dysgerminoma → metastasize to opposite ovary + lower vertebrae	Nodal metastasis – rare Granulosa cell tumours : • Confined to one ovary for long time • If metastasis ⊕ ↓ m.C site: Opposite ovary

Active space

	Epithelial cell tumours	GCT	Sex cord tumours
12. Staging	Surgical TAH + BSO / Debulking surger ↓ stage I & II ↓ Stage III & IV followed by chemotherapy ↓ Except: Stage IA & IB Grade I & II Chemotherapy of choice: Platinum compound + Paclitaxel Note: Ovarian tumours are radio resistant, except	Surgical Conservative surgery → U/L salpingo oophorectomy followed by chemotherapy in all stages Chemotherapy of choice: B – Bleomycin E – Etoposide P – Cisplatin / Carboplatin → Dysgerminoma	Surgical → Young → U/L salpingo oophorectomy → Old → TAH + BSO Followed by chemotherapy in stage III & IV only Chemotherapy of choice: Bleomycin, Etoposide and Paclitaxel

CANCER OVARY – 2

Dermoid cyst 00:00:21

m.c benign tumour of ovary: Dermoid cyst

m.c benign epithelial tumour of ovary: Serous cystadenoma

m.c solid benign tumour: Fibroma

m.c benign tumour of ovary in pregnant female: Dermoid cyst

m.c malignant tumour of ovary in pregnant female: Dysgerminoma

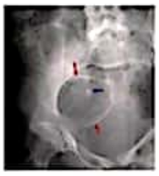
Dermoid cyst

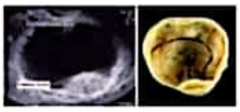
- B/L in → 10%
- Risk of malignancy → < 2% (m.c malignancy Squamous cell Ca)

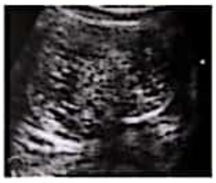
- Derivatives of all 3 germ layers ⊕
  m.c → Ectoderm (100% cases)
- Unilocular
- Filled with cheesy / Sebaceous material
- Rokintansky protuberance ⊕ → Teeth / Hair arise from here

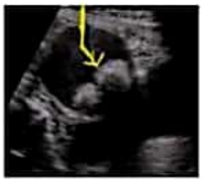
X-ray findings in dermoid cyst:

- Teeth / bone pieces
- Rokintansky protuberance
- Dot and dash appearance
- White ball appearance



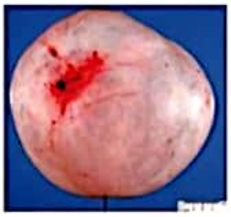
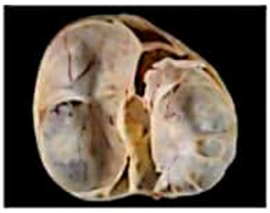
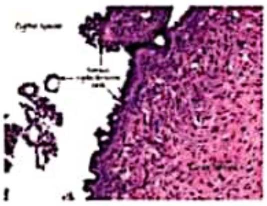
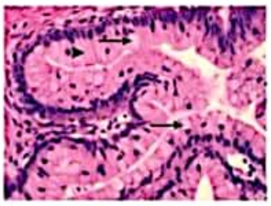






Benign tumours of ovary

00:09:31

Serous cystadenoma	Mucinous cystadenoma	Brenner tumour
Lining: resemble fallopian tube (ciliated epithelium)	Resembles glandular cervical epithelium	Resemble urethral lining (transitional epithelium)
Malignant: 40%	≤ 20%	mostly benign
B/L: 20%	10%	mostly U/L
Unilocular cyst filled with clear fluid	Multilocular cyst filled with mucinous material cut section: Honeycomb appearance	Rubbery consistency
Histology: Psammoma bodies – concentric fine calcific granulations seen on X-ray	Associated with: Pseudomyxoma peritonei	Histology: Walthard cell rest + coffee bean nucleus Associated with pseudo meig syndrome
		
Histology: 		

Note:

solid benign tumours of ovary:

fibroma (m.C) > Brenner

Pseudomyxoma peritonei and Meig syndrome 00:22:35

Pseudomyxoma peritonei

- Abundant mucoid material in abdominal cavity and pelvis
- m.C cause (Overall): Appendix cancer
- m.C ovarian tumour associated → mucinous tumours
  Other causes: mucocele of appendix
- Bad prognosis (recurrence ↑)

meig syndrome

Ovarian tumour (Fibroma) + Ascites + Right sided pleural effusion

Pseudomeig syndrome

Any ovarian tumour other than fibroma
(Brenner's, granulosa cell tumour, thecoma)
+
Ascites
+
Right sided pleural effusion

Borderline ovarian tumours 00:25:10

Low malignant potential tumours

Younger age groups (30-50years)

Stromal invasion absent

Incidence: 10%

management → Conservative surgery
U/L Salpingo oophorectomy

Indications of conservative surgery in ovarian carcinoma: (U/L Salpingo oophorectomy)

1. Borderline tumours
2. Germ cell tumours
3. Sex cord tumours in a young female
4. Epithelial cell tumours in young female (early stages)

Malignant tumours 00:28:10

Etiology:

↑ estrogen: ↑ risk

↑ ovulation: ↑ risk (Theory of incessant ovulation)

Risk factors:	Protective factors:
• Nulliparity	• multiparity Pregnancy
• Obesity	• Physical exercise, smoking (inhibit aromatase enzyme)
• Early menarche Late menopause	• Anovulation OCPs Breast feeding
• Clomiphene citrate / ovulation inducing drugs PCOD / infertility	• Tubal ligation hysterectomy (protect ovary from exposure to carcinogens)
• Workers in asbestos factories	
• Dysgenetic gonads	
• HRT +/−	

Hereditary ovarian cancers 00:34:30

- 5-10 % of all ovarian cancers → Hereditary

  BRCA 1 gene: Chromosome 17 } Autosomal dominant inheritance
  BRCA 2 gene: Chromosome 18 }
  HNPCC gene mutation

- Characteristic features:

  Occurs 10 years earlier than usual age of onset
  screening can be done (TVS + Ca 125)
  best method to ↓ risk of carcinoma → TAH + BSO at 35 years of age but not later than 40 years

Malignant ovarian tumours 00:37:40

Malignant Epithelial tumours:

Associated with p53 & K RAS mutation

m.c → p53 (aggressive type)

Germ cell tumours

1. Dysgerminoma
   - 2nd m.c malignant GCT
   - Best prognosis
   - most radiosensitive
   - m.c ovarian Ca in pregnancy
   - Associated with dysgenetic gonads (Y chromosome ⊕)
     - Eg: Turners – 45 XO / 45 XY
     - Swyer – 46 XY

Note: m.c tumour associated with dysgenetic gonads

↓

Gonadoblastoma (Benign)

↓ 40%

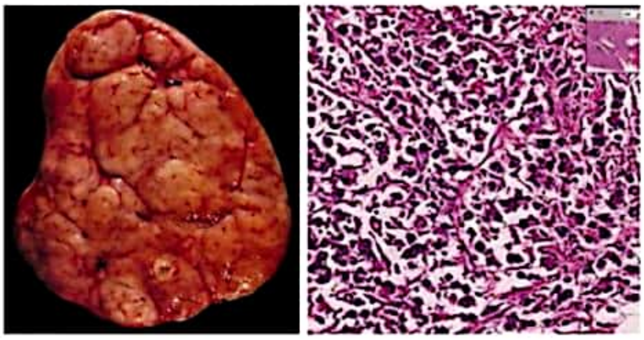
Dysgerminoma

Tumour markers : Placental ALP, LDH

Gross appearance: Solid pink to tan lobulated mass

Histology:

- Large, polyhedral cells rich in glycogen (clear cytoplasm)
- Prominent nuclei
- Eosinophilic fibrous septa

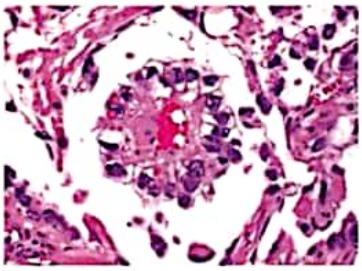


Yolk sac tumours
- most malignant GCT
- worst prognosis
- U/L in 100% cases ∴ Biopsy of opposite ovary contraindicated

On HPE

Schiller Duval body

- Central capillary surrounded by tumour cells present in a cystic space



Tumour markers: AFP
Anti trypsin

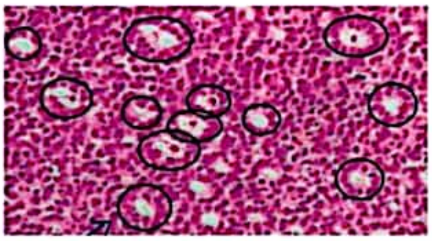
Sex cord tumours

00:46:20

Granulosa cell tumours:

On HPE:

↓



Typically crowded cells, scanty pale cytoplasm

Nucleus → Groove ⊕

(Coffee bean nuclei)

Call Exner bodies → Small eosinophilic fluid spaces with rosette arrangement of cells

Tumour markers: Inhibin

Tumour	Tumour marker
Non mucinous epithelial tumour	CA 125
mucinous epithelial tumor	CA 19-9, CEA
Yolk Sac tumours	AFP, Anti trypsin
Choriocarcinoma	hCG
Dysgerminoma	LDH, Placental ALP
Embryonal tumours	hCG, AFP
Granulosa cell tumours	Inhibin

Staging laparotomy

00:51:20

Steps:

Incision (midline vertical)

↓

All abdominal organs inspected and palpated

↓

Samples: 1) Ascitic fluid – If present
- If absent → Add fluid and collect peritoneal washings

2) Diaphragm

3) Pelvic & Para aortic lymph nodes

↓

Biopsy: multiple peritoneal biopsies

↓

TAH + BSO + Infracolic omentectomy [Early stages]
(not omental biopsy)

Or

Debulking surgery + infracolic omentectomy [Advanced stage]

Staging of ovarian carcinoma

00:55:10

FIGO staging (2014)

Stage 1: Tumour limited to ovary

A → One ovary involved

B → Both ovaries involved

- Capsule intact
- No growth on ovarian surface
- Peritoneal washing – negative

C → One / Both ovaries involved

C_1 : Intra-operative rupture of capsule

C_2 : Pre-operative rupture of capsule

C_3 : Malignant ascites / Peritoneal washing – positive

Stage 2: Tumour spreads to pelvic organs / Peritoneum below pelvic brim / 1° peritoneal carcinoma

A → Fallopian tubes / uterus involved

B → Pelvic lymph nodes involved

Active space

Stage 3: Retroperitoneal lymph nodes involved (RPL LN) or Peritoneum above pelvic brim involved

A_1 → Retroperitoneal node involvement

- A_1(i) 10 mm
- A_1(ii) >10 mm

A_2 → microscopic involvement of peritoneum above pelvic brim

B → macroscopic involvement of peritoneum ≤ 2cms or capsule of liver & spleen ± RPL LN

C → macroscopic involvement of peritoneum >2cm or capsule of liver & spleen ± RPL LN

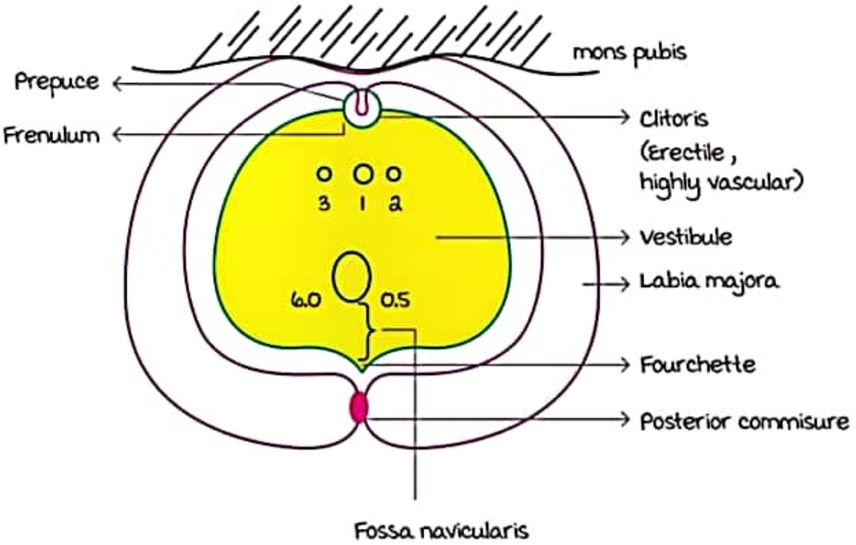
Stage 4:

A → Pleural Effusion

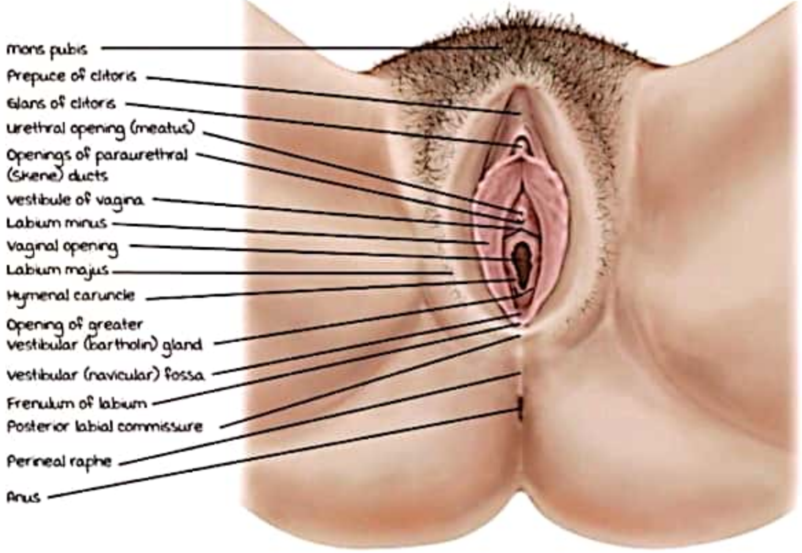
B → metastasis / Parenchyma of liver & spleen / Inguinal lymph node involvement

ANATOMY OF VULVA

Female external genitalia (vulva)


mons pubis
Prepuce
Frenulum
Clitoris
(Erectile,
highly vascular)
3 1 2
Vestibule
Labia majora
6.0
0.5
Fourchette
Posterior commisure
Fossa navicularis

Female external genitalia


mons pubis
Prepuce of clitoris
Glans of clitoris
urethral opening (meatus)
Openings of paraurethral (Skene) ducts
vestibule of vagina
Labium minus
Vaginal opening
Labium majus
Hymenal caruncle
Opening of greater vestibular (bartholin) gland
vestibular (navicular) fossa
Frenulum of labium
Posterior labial commissure
Perineal raphe
Anus

Clitoris :

- Analogous to penis in males
- Erectile & highly vascular

Active space

Labia majora :

Round ligament terminates at anterior $1/3^{rd}$ of labia majora
has hair follicles , sweat glands , sebaceous glands
and modified sweat glands known as (k/a) apocrine glands
posterior commisure - Posterior meeting point of labia majora
Homologous to scrotum in males

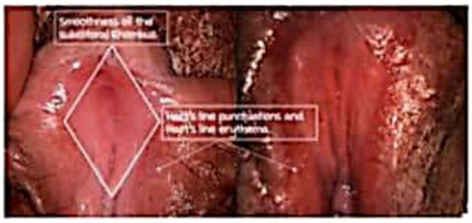
Labia minora

00:03:57

Labia minora :

Encloses clitoris from above - k/a prepuce
and from below - k/a frenulum
no hair follicle, apocrine glands , sweat glands
Has numerous sebaceous glands.

Outer side → Lined by keratinized squamous epithelium
medial (inner) side → Lined by non - keratinized squamous epithelium
Outer & medial side separated by Hart's line
↓



m.c site of vulval Ca
m.c type of vulval Ca: Squamous cell Ca

Fourchette: Posterior meeting point of labia minora

Vestibule

00:09:32

Boundaries :

Anterior → Clitoris
Lateral → Hart's line (or labia minora)
Posterior → Fourchette

6 openings :

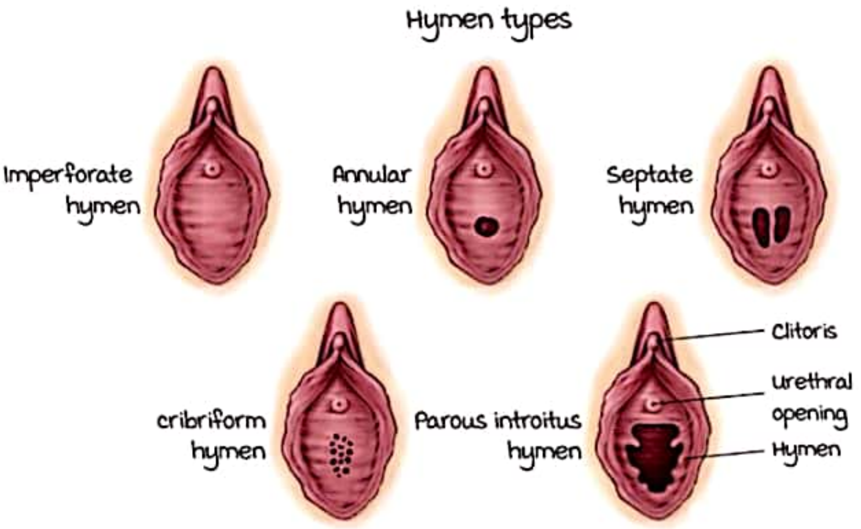
1. Urethra
2 & 3. Openings of paraurethral / Skene glands (homologous to prostate gland in male)
4. Opening of vagina k/a introitus
↓
Covered by a thin membrane → Hymen
5 & 6. Openings of Bartholin glands

Fossa navicularis:

Area between introitus and fourchette

Types of hymen

00:14:04


Hymen types
Imperforate hymen
Annular hymen
Septate hymen
cribriform hymen
Parous introitus hymen
Clitoris
Urethral opening
Hymen

1. Annular hymen
2. Cribriform hymen
3. Septate hymen
4. Imperforate hymen

Blood supply of vulva : Internal pudendal artery

Nerve supply : Pudendal nerve

Lymphatic drainage :

Superficial inguinal lymph node (LN) (Sentinel LN)

↓

Deep inguinal / Femoral nodes

∴ In vulva cancer (ca) → Inguino femoral lymph node dissection done

Clitoris → Drains directly into deep inguinal nodes

↓

Lymph node of cloquet /
Rosenmuller lymph nodes

Vulva lymphatics :

- Structures that lie within 2cm of midline
  → Lymphatics cross each other

∴ Bilateral (B/L) inguinofemoral LN dissection done for
Cancer arising in this area /
Clitoris / Fourchette / Anterior labia minora

- Lymphatics of structures that lie > 2cm away from midline → Do not cross
  ∴ Unilateral lymph node dissection.
- Pelvic lymph node involvement in vulval cancer → Stage IV B (metastases)
  ↓
  External iliac
  Internal iliac
  Common iliac nodes
- Sentinel lymph node biopsy (SLNB) node biopsy done in vulva cancer > Ca cervix
- Dye used in SLNB in vulval Ca – Isosulphan blue dye

Development of vulva

00:22:52

- Clitoris : Genital tubercle
- Labia majora : Genital swelling
- Labia minora : Genital folds

Lining of vulva :
Lateral to Hart line : Keratinized squamous epithelium
Medial to Hart line : Non – Keratinized squamous epithelium
Hymen and Clitoris : Stratified squamous epithelium

Bartholin glands
Pea – sized, oval shaped glands, 2 in number
Racemose variety of glands
Located in superficial perineal pouch between labia minora and majora at 4'O clock & 8'O clock position

- Homologous to Couper glands/Bulbourethral gland in males (in deep perineal pouch)
- Ducts of these glands open in vestibule Outside hymen → At junction of anterior $2/3^{rd}$ and posterior $1/3^{rd}$
- Impalpable; if palpable → Bartholin cyst
- Lining
  Gland → Columnar epithelium

Active space

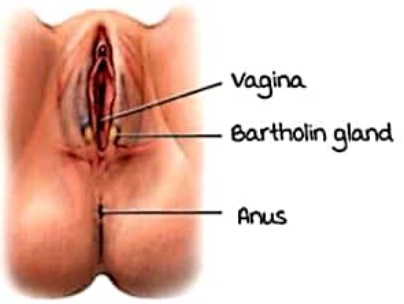
Duct → Transitional epithelium
Opening → Squamous epithelium

Bartholin cyst

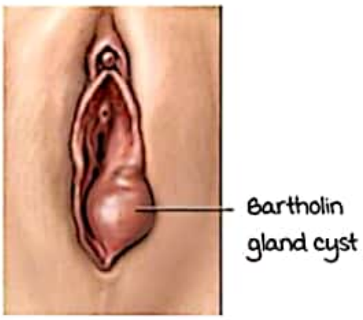
00:27:42

- Block of bartholin duct
- Between labia majora & minora

Anatomy of Bartholin gland



Bartholin cyst



Gartner's cyst → Anterolateral wall of vagina
M.C variety of vaginal cyst → Inclusion cyst

Warning : Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Management of Bartholin cyst:

- Asymptomatic ↓ No treatment
- Symptomatic ↓ Marsupialisation

Bartholin abscess :

M.C organism : E.coli > Gonorrhea
Management : Incision and drainage

Dissection of perineum (from outside to inside)

Active space

VULVAL CANCER

- Comprise of 4% of all gynaecological cancers
- most common variety of vulval cancer → Squamous cell cancer [90 – 92%]
- 2nd most common variety of vulval cancer → Melanoma [2–4%]
- most common site → Harts line > Labia minora > Labia majora
- Types of squamous cell variety of vulval cancer → warty & Keratinizing

Warty/Basaloid	Keratinizing
1. Young females	1. Older females
2. Unifocal	2. Multifocal
3. Good prognosis	3. Bad prognosis
4. Associated with - Human papilloma virus [HPV] infection - Smoking - Vulval intraepithelial neoplasia	4. Associated with - Lichen sclerosis - Squamous cell hyperplasia - Mutation in p^{53} gene

- most common age group for vulval cancer ≥ 65– 70 yrs

Vulval cancer – Risk factors & Clinical presentation 00:04:03

1. Risk Factors

a. HPV infection [most common – HPV -16, others – HPV 18, 31, 33, 45]

b. Herpes simplex virus infection in smokers [Not a risk factor in non- smokers]

c. Smoking

d. Chronic immunosuppression

e. Lichen sclerosis

f. Squamous cell hyperplasia

g. Pagets disease (extra – mammary) → Adenocarcinoma of vulva

h. Vulval Intraepithelial neoplasia $\xrightarrow{\text{4 years}}$ Vulval Cancer

2. Symptoms of Vulval Cancer
   - Pruritis (most common)
   - Ulcer
   - mass
   - Bleeding
   - Cachexia

Vulval cancer – diagnosis, spread & prognosis 00:07:47

3. Diagnosis of Vulval Cancer
   - Initial Diagnosis
     - If lesion is not visible
       - Vulvoscopy [3% acetic acid]
   - Definitive diagnosis
     - Biopsy
       - Punch Biopsy
       - wedge Biopsy

4. Spread of Vulval Cancer
   - Direct Spread
     - Vaginal
     - Urethra
   - Lymphatic Spread
     - Sentinel Lymph node (LN)
       ↓
       SIN
       (Superficial inguinal lymph node)
       - LN not involved
       ↓
       Pelvic LN
   - Hematogenous Spread

5. Prognostic factors
   a. Single most important prognostic factor → Involvement of LN

   - Involvement of LN
     - Not involved
       ↓
       5 year survival rate = 85%
     - Involved
       ↓
       5 year survival rate = 50%

b. Depth of the lesion

<1 mm → [Good Prognosis] No LN involved → LN dissection – Not required

≥1 mm → LN are involved

Vulval cancer – Staging

00:11:51

Clinical & Surgical Staging done

- Involvement of Lymph nodes

  Stage 1 & 2 – LN not involved

  Stage 3 & 4 – LN involved

  Stage 3c – LN involvement + extracapsular spread

  Stage 4A2 – LN is fixed & ulcerated

  Stage 4B – Pelvic LN involved

- Staging

  Stage 1 – Cancer is limited to vulva, No LN involved

Stage 1 → Stage 1A, Stage 1B

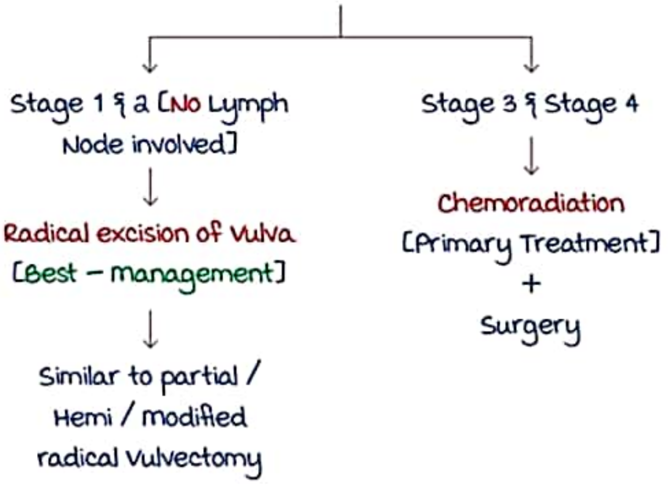
	Stage 1A	Stage 1B
Tumor Size:	$\leq$ 2 cm	$>$ 2cm
Depth of invasion:	$\leq$ 1mm	$\geq$ 1mm

Stage 2 – Cancer involving lower part of adjacent structures [Lower 1/3rd of – vagina, Lower 1/3rd of anus, Lower 1/3rd of urethra] No Lymph node involvement

Stage 3 – Any tumor Size, Adjoining structure involvement – +/–
– Lymph nodes are involved

Stage 4 – 4A – Upper part of adjacent structures involved [upper vagina/ anus/ rectum/urethra]
– Lymph nodes are involved
4B – Pevlic LN are involved

Vulval cancer – Management 00:16:55



Stage 1 & 2 [No Lymph Node involved]
↓
Radical excision of Vulva [Best – management]
↓
Similar to partial / Hemi / modified radical Vulvectomy

Stage 3 & Stage 4
↓
Chemoradiation [Primary Treatment]
+
Surgery

- Incase of Benign / Premalignant lesion
⇓
Wide local excision

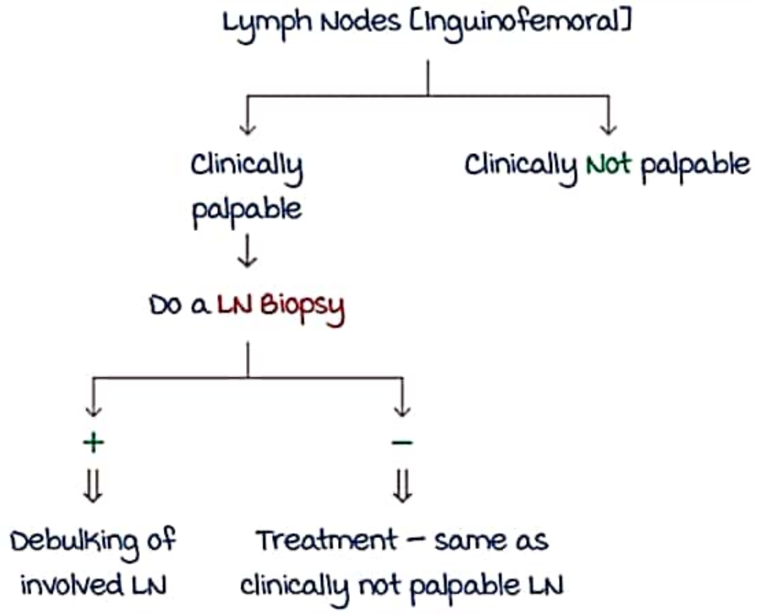
2. management of Lymph Nodes

Principles: a. LN dissection
↓
Inguinofemoral LN dissection

b. Cancer is ≤ 2 cm from midline
⇓
Bilateral inguinofemoral LN dissection

c. Cancer is > 2cms from midline
Unilateral inguinofemoral LN dissection

Aproach to lymph node dissection in vulval cancer 00:21:46



Lymph Nodes [Inguinofemoral]

Clinically palpable
↓
Do a LN Biopsy

+
⇓
Debulking of involved LN

–
⇓
Treatment – same as clinically not palpable LN

Clinically Not palpable

Approach to clinically not palpable LN
↓

- Only stage IA [Size < 2 cm, Depth of invasion < 1 mm]
  - No Lymph node dissection is done
- Rest all the stages
  - Inguinofemoral LN dissection is done

Unilateral LN dissection

- Criteria
  - i) Size of tumor < 2 cm
  - ii) Laterally present [> 2 cms away from midline]
  - iii) LN should not be palpable clinically

Bilateral LN dissection

- Done for cases which do not fall under unilateral LN dissection

Active space

CONTRACEPTION - NATURAL AND BARRIER METHODS

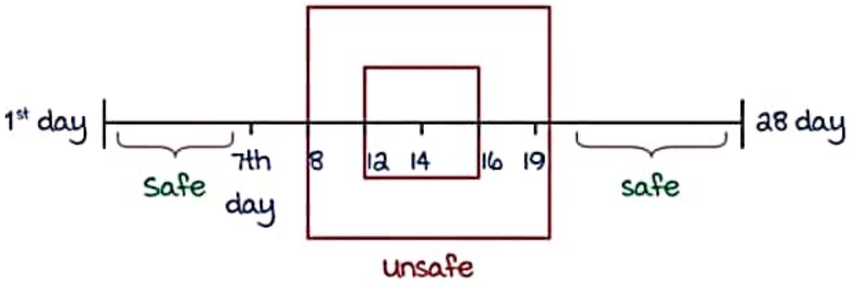
Classification of contraceptives

00:00:40

- Reversible
  - i) Natural methods
  - ii) Barrier methods
  - iii) Combined oral pills (OCP's)
  - iv) Patches and Rings (estrogen + progesterone)
  - v) Progesterone only pills (POP)
  - vi) Implants
  - vii) Injections
  - viii) IUCD
    - Cu IUCD, mirena
  - vii) Injections and viii) IUCD → Long acting reversible contraceptive (LARC)
- Irreversible / permanent methods
  - In females
    - Tubectomy
    - Essure (Hysteroscopically)
  - In males
    - Vasectomy (No scalpel vasectomy)

Natural methods - calendar / rhythm method

00:07:07



In a 28 day cycle
↓

- Unsafe to have intercourse – 8-19 day
- Safe to have intercourse – 1-7 days & 20-28 days (1st week and last week of cycle)

Disadvantages of calendar method 00:09:58

i) Can only be practiced by educated females
ii) Couple has to be motivated
iii) Irregular cycles
iv) During breast – feeding or immediately after delivery

- If the cycle is irregular – Based on Ogino – Knaus theory

↓

1st day of unsafe period – calculated by

↓

Shortest cycle – 18

↓

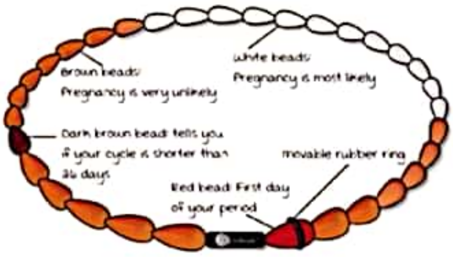
Last day of unsafe period – calculated by

↓

Longest cycle – 11

Cyclebeads or tirumala method 00:13:25

- A/K/A Standard day method


White beads:
Pregnancy is most likely
Brown beads:
Pregnancy is very unlikely
Dark brown bead: tells you if your cycle is shorter than 26 days
movable rubber ring
Red bead: First day of your period

- Helps female to have a track of her cycle.
- In tirumala – A movable rubber band is attached

↓

This rubber band is moved from one bead to another

- Red bead – 1st day of cycle
- Brown beads – Depicts safe period
- White beads – Depicts unsafe period

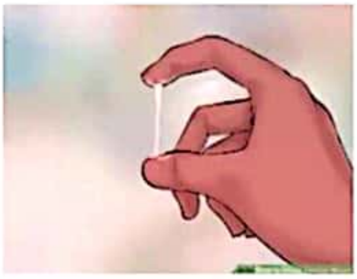
- Dark brown bead – On day 26
  ↓
  Short cycles – menstruation begins before day 26
  ↓
  Cannot rely on tirumala method
- Tirumala method is used only if the cycle
  ↓
  Is between 26 – 32 days
- Failure rates – 2 / Hundred women year

Cervical mucus method or Billings method

00:19:26

- At the time of ovulation – Cervical mucus is thick
- Cervical mucus is thin and can be stretched in between fingers
  ↓
  Safe period
- Cervical mucous thick, Scanty
  ↓
  Unsafe period

Billings cervical mucus method



- Check Basal body temperature daily (in the morning)

↓

At the time of ovulation – Basal body temperature ↑

↓

unsafe period

- Symptothermic method – Cervical mucus method
+
Basal body temperature

Barrier methods - male and female condoms

00:22:37

male condom	Female condom
• Contraceptive + protection against Sexually transmitted diseases (STD)	• Protection against STD not as effective a male condom
• Protection against pelvic inflammatory disease (PID)	• Protection against pelvic inflammatory disease
• Protection against ectopic pregnancy	• Protection against ectopic pregnancy
• Protection against HIV	• Protection against HIV not as effective as male condom
• Protection against HPV infection	• Protection against HPV
• Protection against cancer cervix and cervical dysplasias	• Protection against cancer cervix, cervical dysplasias

Active space

Disadvantages of male condom

1) Contact dermatitis in female partner
2) used only once
3) Sexual pleasure is reduced
4) Failure rates – 2 –15 /HWY

Disadvantage of female condom

1) UTI in female partner
2) used only once
3) Sexual pleasure is reduced
4) Failure rates – 5 – 20/ HWY
5) Cannot be used in females with cystocele, rectocele, retroverted uterus

Male condom

Female condom

Female and male condoms contraindications and uses 00:28:09

Contra-ceptive	STD/ PID	Ectopic pregnancy	Emergency Contraceptive	Contraindication
male condom	↓	↓	×	
Female condom	↓	↓	×	Uterine prolapse / Retroverted uterus

In a HIV patient best contraception
1st – IUCD + Barrier method
2nd – IUCD
3rd – Barrier method

Diaphragm and sponges 00:32:38

Today sponge

Diaphragm

Active space

vaginal diaphragm	Today sponge
• Not a sperm proof mechanical barrier ↓ Need to add spermicide • Placed in vagina few minutes to a hours before intercourse (max – 6 hours) • Should be removed 6 – 8 hours after intercourse • max time to keep inside body 24 hours	• mushroom shaped disposable sponge – has 1gm of Nonoxynol – 9 (spermicide) • Concave side – face cervix • Can be inserted 24 hours before intercourse • Should be removed max 6 hours after intercourse • max time to keep sponge inside body – 30 hours • Gives continuous protection for 24 hours irrespective of number of times of intercourse

Diaphragm and sponge - contraindications and toxic shock syndrome

00:38:38

Contraceptive	STD / PID	Ectopic pregnancy	Emergency Contracep	Contraindication	Special uses
Diaphragm and sponge	↓	↓	×	Diaphragm – prolapsed / Retroverted uterus	• No protection against HIV • No special uses

Toxic shock syndrome

↑ Chances with
↓
Female condom
diaphragm

↓ Chances with
↓
Today sponge

Complications of diaphragm and sponge

Diaphragm
- Toxic shock syndrome (TSS)
- Cervical erosion
- UTI

Sponge
- Does not cause TSS
- Allergic reactions
- Vaginal dryness

Spermicide 00:42:34

Disrupts the Sperm cell membrane

e.g:-
- Nonoxynol-9
- Oxytecnol
- menfegol

if used alone → very high failure rates → So used in combination with barrier contraceptives

Pearl index

- measures efficacy of contraception
- Best method to measure efficacy – Life table analysis
- Formula

A

$$\frac{\text{No. of accidental pregnancies}}{\text{No. of females that used contraceptive} \times \text{Years of use}} \times 100$$

B

$$\frac{\text{No. of accidental pregnancies}}{\text{No. of females that used contraceptive} \times \text{months of use}} \times 1200$$

Calculation of pearl index 00:47:19

- E.g – If a contraceptive 'x', used by 100 females, used for 3 years out of 100 – 24 females conceived
- By Formula A = $\frac{24 \times 100}{100 \times 3 \text{ yrs}}$ = Pearl index = 8
- By Formula B = $\frac{24 \times 1200}{100 \times 36 \text{ months}}$ = Pearl index =8

Pearl index for user independent and dependent methods

00:51:00

For user independent method

1) Implants - 0.05 %

2) Sterilization - male - 0.1 %

Female - 0.5%

3) IUCD - mirena - 0.2%

Cu T380A - 0.6%

For user dependent methods

	Perfect use	Typical use
OCP'S	0.3%	8%
Ring	0.3%	8%
Patch	0.3%	8%
DMPA (Depot medroxy progesterone Acetate)	0.3%	7%
Sponge	9	15
male condom	2	15
Female condom	5	20

ESTROGEN AND PROGESTERONE CONTAINING CONTRACEPTIVES

OCP

00:00:14

- Pills with estrogen + Progesterone
  ↓
  Negative feedback on LH
  ↓
  LH surge absent
  ↓
  No ovulation
- Main mechanism of action of OCP: Anovulation
- Main mechanism of IUCD:
  1. Inhibits fertilization
  2nd best: Inhibits implantation
  Never acts by anovulation
- Other mechanism:
  Synthetic Estrogen
  ↓
  Negative feedback on FSH
  ↓
  Inhibit Folliculogenesis
- Progesterone: Makes cervical mucus thick
- Classification:

Dose wise

Estrogen dose :
High dose : > 50 mcg
Low dose < 50 mcg
Average : 30 - 35 mcg

Minimum effective dose of estrogen : 10 mcg

FDA : Lo Loestrin Fe

Generation wise

Progesterone component :
1st generation : Norethinone
2nd generation : Levonorgestrel
3rd generation : Desogestrel
Norgestimate
Gestodene
4th generation : spironolactone
Drospirinone
Cyproterone acetate

Active space

yasmin
BAYER

4th generation pill progesterone: Drospirenone

BAYER
Diane®-35

Progesterone: Cyproterone acetate

with Ferrous Fumarate Tablet I.P.
माला-डी
Mala-D
ORAL CONTRACEPTIVE PILLS
For Oral use by Women

Mala – N and Mala – D has same composition
→ Estrogen: Ethinyl Estradiol → 30 mcg
→ Progesterone: Levonorgestrel → 0.15 mg
→ 21 white tablets + 7 brown tablets → Ferrous Fumarate

- Mala-N: Distributed freely by Government of India
  Mala-D: Not available free of cost

OCP usage 00:12:04

- Ideally: start from Day 1 } No backup method needed (Day 1–Day4)
- Can also start: < Day 5 }
- Day 5 or any day after Day 5 : Backup method of contraception × 7 days → AKA Quickstart

- Should not be used → Breast feeding female
  → After delivery < 6 weeks
  → In patients who are on drugs which are Enzyme inducers
  ↓
  Accelerate metabolism of OCP
  ↓
  Efficacy of OCP ↓

Eg:

- Phenytoin
- Phenobarbitone
- Valproic Acid
- Rifampicin

- On missing the pill:

One pill
↓
Next day: Can take 2 pills(no backup needed)

≥ 2 pills
↓
On remembering: Takes one pill
+
1 pill of the day
+
Backup method of contraception × 7 days

- Clinical case: Female misses her pill at the end of pack, she doesn't have any bleeding
  management: Next step → Pregnancy Test

- M.C side effect: Break through bleeding

Other uses and disadvantages of OCP pills

00:22:31

- Non – contraceptive uses of OCP:

1. Regularise cycles
   DOC: for irregular cycles
2. Anovulation : management of 1° dysmenorrhea
   management of PMS

3. Pregnancy: ↓ LH → ↓ Androgens
   DOC: for Hirsutism
   management of Acne

4. ↓ FSH → ↓ Natural Estrogen

Hyper estrogenic conditions like:
→ Fibroid
→ Endometriosis

↓ Endometrial cancer
↓ Ovarian cancer
↓ Ovarian cyst
↓ Colon cancer
↓ Benign Breast diseases

Disadvantages:

- ↑ Depression
- ↑ Cancer cervix – Adenocarcinoma
  - ≥ 5 years
  - Reversible
- ↑ Gall stones
- ↑ Cholelithiasis

- No effect on:
  1. Breast cancer
  2. Hepatic Adenoma
  3. Hepatocellular carcinoma
  4. Gall Bladder cancer

- **Clinical case:** Female who is on OCP has spotting (on pills)

Spotting
↓
Doesn't indicate failure
↓
If spotting doesn't disappear spontaneously in 1–3 cycles

Spotting: 1st Half
↓
Estrogen ↑

Spotting : 2nd Half
↓
Progesterone ↑

Active space

- On use of OCP:
  1. Return of fertility: within 3 months
  2. Quickstart: not teratogenic

OCPs : Contraindications and special uses

Contraceptive	STD/PID	Ectopic Pregnancy	Emergency contraception	Contraindications	Special uses
OCPS	↓ Chlamydia and candida	↓ (least chances of ectopic pregnancy)	Yuzpe method	mnemonic: Banks Have various Schemes To provide Home Loans During may: B → Breast cancer H → Hypertension (moderate-severe ≥ 160/110) V → Undiagnosed vaginal bleeding S → Smoker ≥ 35 years P → Pregnancy H → High cholesterol High triglycerides L → Liver disease D → Diabetes with vasculopathy m → migraine with aura	Contraceptives of choice: 1. After H mole evacuation 2. Young married couple living together 3. Spacing of Pregnancies DOC: 1. Hirsutism 2. Irregular cycles 3. 1° Dysmenorrhoea management → Ovarian cyst → Fibroid → Endometriosis

Other estrogen and progesterone containing contraceptives

00:38:52

Vaginal Ring

→ Estrogen + progesterone

→ AKA NUVA Ring

→ Ring made of: Ethinyl Acetate

- Outer diameter: 54 mm
- Cross section: 4 mm

→ Estrogen: Ethenyl Estradiol

Progesterone: Etonorgestrel

→ Release Rate:

Estrogen → 15 mcg/day

Progesterone → 120 mcg / day

→ Applied in vaginal × 3 weeks

↓

1 week off

(should be inserted within 3 hours of intercourse)

Transdermal patch

→ Estrogen + progesterone

→ AKA ortho evra patch

→ 20 cm skin patch

→ Estrogen: Ethenyl Estradiol (75 mcg)

Progesterone: Norelgestromin (6 mg)

→ Release rate:

Estrogen: 20 mcg / day

Progesterone: 150 mcg / day

→ Each patch → 1 week

3 patches in a pack

3 weeks → On

1 week → Off

1. ↑ venous thrombosis and embolism
2. ↑ failure rate in obese female

Active space

PROGESTERONE ONLY CONTRACEPTIVES

Types of progesterone only contraceptives : 00:00:12

1) Progesterone only pills (POP)
2) Progesterone Injections
3) Progesterone Implants

Classification of progesterone :

Older generation
↓
- Includes 1st and 2nd generation progesterone
- Low concentration

↓ MOA

Thickens cervical mucus

→ Long term exposure of progesterone causes:
- Endometrial atrophy
- Amenorrhea

Newer generation
↓
- Includes 3rd and 4th generation progesterone
- High concentration

↓ MOA

Inhibit ovulation

Advantages :

1) Used in lactating females
2) No effect on carbohydrate metabolism

↓

Except : Progesterone only pills

3) No effect on lipid metabolism

↓

Except : Depot medroxy progesterone acetate (DMPA)

↓

↑ LDL and ↓ HDL

4) No effect on clotting factors

- In patients with history of thrombosis
  - Management ↓
    - POP
  - Contraindications ↓
    - • Implants
    - • Injections

5) Reduce pelvic inflammatory disease (cervical mucus –thick)

Side effects and contraindications

00:06:27

Side effects :

1) Irregular bleeding (mc)
2) Incase of failures
   ↓
   increased chance of ectopic pregnancy.
   (due to reduced peristalsis of tube)
3) Not an emergency contraceptive method.

Contraindications :

1) Undiagnosed vaginal bleeding.
2) Liver disease.
3) Previous history of thrombosis , ectopic pregnancy
   ↓
   Not a contraindication for Progesterone only pills (POP)
4) Pregnancy
5) Breast cancer

Leave Feedback

Progesterone only pills / minipills 00:09:54

Older generation
↓
mechanism of action
↓
Thickens cervical mucus

- Taken at same time (daily)
- Grace period / Delay: 3hrs acceptable
- If patient forgets
  ↓
  Alternate method of contraception done for 48hrs

New generation
↓
1) Desogestrel
2) Cerazzete (India)
↓
mechanism of action
↓
Anovulation

- Taken at same time (daily)
- Delay of 12hrs acceptable

Advantages of progesterone only pills: 00:15:14

1) Contraceptive method of choice
2) Can be used in lactating females
↓
POP > Intrauterine contraceptive device.

- In lactating female POP started at :

CDC / ACOG recommendation
↓
Immediately after delivery
↓
Currently followed

WHO recommendation
↓
After 6 weeks

Active space

Progesterone injections

00:19:12

Depo Provera Injection

↓

Depot of medroxy progesterone acetate (DMPA)

Dose: 200 mg

- → Government of India distributing this as 'Antara'

↓ included in

National family control programme

- → MOA : Inhibit ovulation
- → Repeat after 3 months
- → Delay of 4 weeks acceptable
- → Both DMPA and NET En injections

↓

- Given within first 7 days of cycle
- Are effective within 24hrs

NET En Injection

↓

Norethindrone

Dose: 150mg

- → MOA : Inhibit ovulation
- → Repeat after 2 months
- → Delay of 2 weeks acceptable

Injection depo provera

Depo-Provera®
Contraceptive Injection
150 mg per mL

Depot of medroxy progesterone acetate (DMPA)

Advantage	Disadvantage
① Can be given to lactating female ② Reduce seizure frequency ③ Decrease sickling in sickle cell anemia ↓ Contraceptive drug of choice	① Decrease bone mineral density ② Delayed return of fertility ↓ mostly by: 12 months maximum: 18 months

Implants

00:25:22

Norplant
- → Contains 6 rods
- → Not used

Implanon
- → Single rod
- → Length: 4cm
- → Contains: Etonorgestrel
- → Not radio-opaque

Nexplanon (recent)
- → Radio-opaque

Implants

Norplant

Implanon

Nexplanon

Etonorgestrel

- Dose : 68mg
- Released at a rate of 67 mcg/day
- MOA : Inhibits ovulation
- Inserted within 5 days of menstrual period
- Inserted by piercing 6 – 8 cms above medial epicondyle in the non – dominant hand
- OPD procedure , done under LA
- Inserted immediately after delivery
  ↓
  Effective immediately
- Does not decrease bone mineral density

Implanon

Active space

Contraceptive	STD / PID	Ectopic pregnancy	Emergency contraception	Contraindications	Uses
Progesterone only pills	Decrease	Increase	Not used	1) undiagnosed vaginal bleeding 2) Liver disease 3) Pregnancy 4) Breast cancer	1) DOC for lactating female 2) In patients with history of thrombosis 3) used in a smoker ≥ 35 years 4) patients with migraine (aura) ↓ In cases where estrogen is contraindicated, progesterone can be used
Depot of medroxy progesterone acetate (DMPA)	Decrease	Increase	Not used	1) undiagnosed vaginal bleeding 2) Liver disease 3) Patients with history of thrombosis 4) Pregnancy 5) Breast cancer	1) Used in lactating female 2) Epilepsy 3) Sickle cell anemia 4) Decrease bone mineral density
Implanon	Decrease	Increase	Not used	1) Vaginal bleeding 2) Liver disease 3) Patients history of thrombosis 4) Pregnancy 5) Breast cancer	1) Used in lactating female 2) Does not decrease bone mineral density

Active space

INTRA UTERINE CONTRACEPTIVE DEVICE (IUCD)

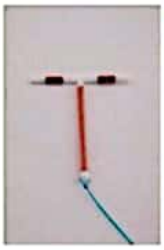
Introduction

IUCD
- 1st generation → Non medicated → Lippes loop → No longer used
- 2nd generation → Cu IUCD (copper)
- 3rd generation → mirena (progesterone containing IUCD)

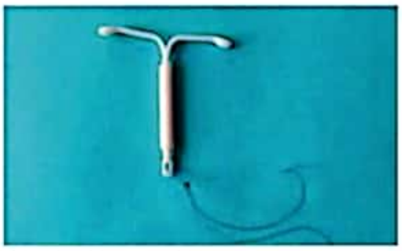
Copper IUCD and mirena IUCD – basic structure

00:00:51

Cu T 380 A



Mirena



Cu T 380 A	Mirena
T- shaped polyethylene frame Surface area of copper wire – 380 mm² A – Copper present on horizontal arms The entire frame work is coated with Barium sulphate – Radiopaque • 3mm ball is present at the end – Prevents cervical perforation	• Plastic IUCD with no copper wire • LNG (levonorgestrel) – Progesterone • Coated with barium sulphate – So Radiopaque • Delivery system for LNG on vertical limb • monofilament thread is present

↓ • A thread is attached to the ball ↓ • Helps in easy remove/ of CuT • Helps to ensure that CuT is in place	

CuT and mirena IUCD – mechanism of action 00:06:47

CUT 380 A	mirena
• A/K/A Paragard	• A/K/A LNG – 20
• Distributed free of cost by the government of India	
• It releases copper (Cu) at 50mcg/day	• The total LNG present – 52mg • It releases – 20mcg/day
• Approved life span – 10yrs	• Approved life span – 5yrs
• It can release Cu upto – 12yrs	• It can release LNG up to – 7yrs
• Expulsion rate : 8 – 10%	• Expulsion rate – 5-6%
• mechanism of action ↓ i) Prevents fertilization - makes the endometrium spermicidal ii) Prevent implantation iii) Does not inhibit ovulation	mechanism of action ↓ Causes endometrial atrophy ↓ Inhibits implantation Doesnot inhibit ovulation

Active space

CuT and mirena iucd – side effects 00:12:19

Cu T 380 A	mirena
• Do not ↓ the risk of pelvic inflammatory disease (PID) ↓	• The progesterone in mirena – makes cervical mucous thick –↓ risk of PID

• Risk of PID is ↑ in 1st month after insertion of CuT • m.c – PID – Actinomyces • ↑ectopic pregnancy if failure occurs • Side effects – i) m.c – ↑ blood loss ii) 2nd m.c – pain in abdomen ↓ m.c.c of removal of IUCD • Other complications – perforation at the time of insertion	• ↑ ectopic pregnancy if failure occurs (more in comparison to Cu IUCD) because progesterons is a smooth muscle relaxant and decreases peristalsis • Side effects – i) m.c – irregular bleeding ↓ Endometrial atrophy ↓ Amenorrhea

CuT and mirena IUCD – uses

00:17:57

CuT 380 A	Mirena
• Can be used as an emergency contraceptive ↓ • most effective • Can be used upto 5 days after intercourse	• Cannot be used as an emergency contraceptive

Timing of insertion of IUCD

- Post placental insertion of IUCD
  ↓
  If IUCD is inserted within 10 mins of delivery of placenta
- Postpartum IUCD insertion
  ↓
  Inserting after 10 mins but before 48 hrs of delivery

- If IUCD is not inserted within 48hrs of delivery

  ↓

  Then inserted after 6 weeks of delivery

  ↓

  Known as Interval IUCD

- In a female, who has not delivered recently

  ↓

  IUCD inserted within 1st 10 days of her cycle

IUCD with missing thread

00:23:08

- In a female with IUCD – if missing threads

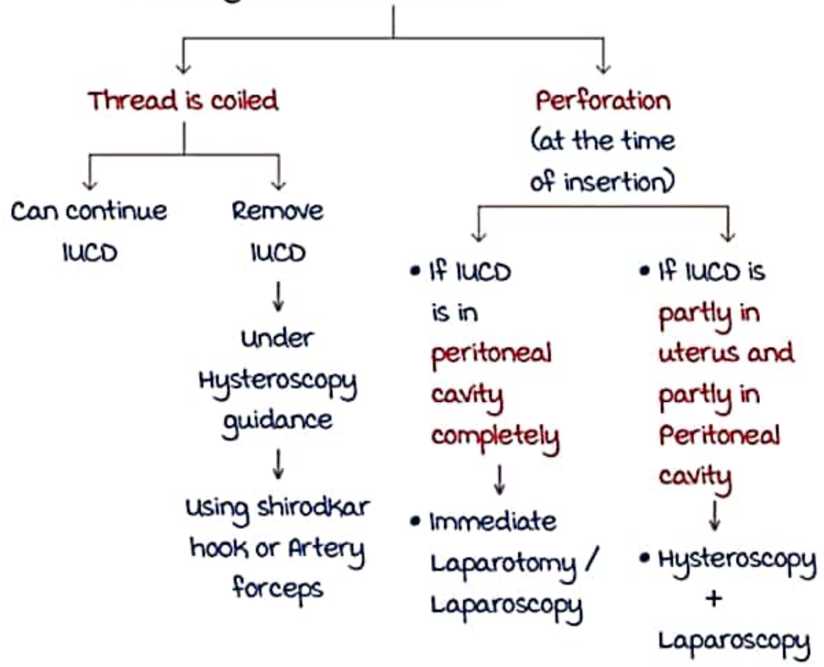
  ↓

  Causes – Thread has coiled
  IUCD has expelled
  Pregnancy
  Perforation of uterus

- If missing threads

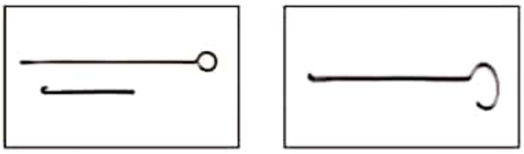
  ↓

  Transvaginal ultrasound (TVS)


Thread is coiled
Can continue IUCD
Remove IUCD
↓
Under Hysteroscopy guidance
↓
Using shirodkar hook or Artery forceps
Perforation (at the time of insertion)
• If IUCD is in peritoneal cavity completely
↓
• Immediate Laparotomy / Laparoscopy
• If IUCD is partly in uterus and partly in Peritoneal cavity
↓
• Hysteroscopy + Laparoscopy

Active space

Hooks for iucd removal - Shirodkar hook



Pregnancy with IUCD

00:28:25

- Continue with pregnancy
  - Terminate pregnancy only if patient is not willing
- If thread is visible
  - Remove IUCD (Preferred method)
- If thread is not visible
  - Continue with pregnancy

Risk to pregnancy with IUCD

- ↑risk of Abortion
- ↑risk of infection
  - Preterm Labor
  - Premature Rupture of membranes
  - IUGR

Contraindications of IUCD – WHO category IV

00:33:00

Absolute contraindications

i) Active PID or PID in past 3 months
ii) Puerperal sepsis
iii) Distorted uterine cavity – due to

- Mullerian malformation
- Fibroids
- Cancer endometrium

Active space

iv) Pregnancy
v) Undiagnosed vaginal bleeding } → Absolute contraindications for anu contraceptives
vi) For Cu T – Wilson disease
vii) For mirena – breast cancer
viii) Previous history of ectopic pregnancy is not a contraindication

Ideal candidate to use IUCD

- In a female who has atleast 1 child
- Female who has monogamous relationship
- Female with no history of PID

Other types of IUCD

00:36:26

- In Nulliparous ↓ Frameless IUCD ↓ Cause less Pain
  - Gynefix 330 ↓ Cu cylinders which are threaded on a polypropylene suture ↓ Attached to myometrium
  - Fibroplant ↓ LNG containing IUCD ↓
    - releases 14mcg/D or
    - 20mcg/D
- Multi load 375 ↓
  - Flexible arms + spurs ↓ ↓expulsion rate
  - It is preloaded in an inserter

Multiload 375

Gynefix 330

CuT and mirena IUCD special uses 00:48:59

Contraceptive	PID/ STD	Ectopic pregnancy	Emergency contraceptive	Contra indication (C I)	Special uses
Cu IUCD	↑	↑	within 5 days	Wilson disease + WHO classification category IV	Contraceptive of choice in i) Heart disease patients (Stable) ii) Diabetic patients iii) HIV patient
mirena	↓	↑	×	Breast cancer + Same as Cu IUCD	In heavy bleeding

- In decompensated heart disease patients

i) Permanent method of choice Vasectomy> Tubectomy

ii) Temporary method
Barrier method

Non steroidal contraceptive – centchroman 00:47:38

- Active ingredient ↓ Ormiloxifene ↓ SERM (Selective estrogen receptor modulator)
- mechanism of action ↓ makes endometrium out of phase ↓ Implantation won't occur
- Developed in ↓ 1991, CDRI Lucknow
- Originally ↓ Trade Name ↓ 'Saheli'

- By the Name of CHHAYA – Distributed free of cost by government of India

Side effect

Delayed menstruation

Dose

- Initial 3 months – 30mg / twice weekly
- Later- 30mg/weekly

Other properties

i) Not teratogenic
ii) Can be used as emergency contraceptive
iii) Does not protect against PID.
iv) Return of fertility – within 6 months of stopping the drug

Centchroman

PERMANENT CONTRACEPTION

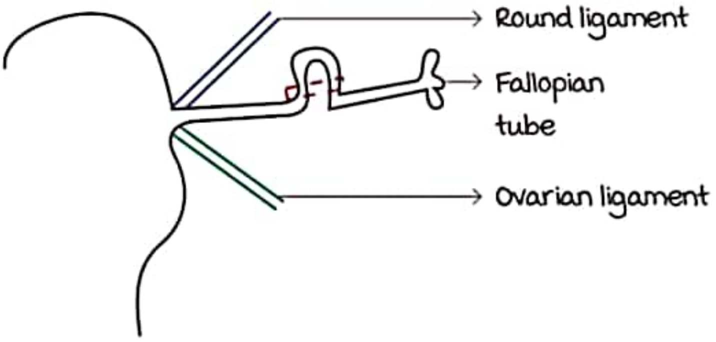
Tubectomy

00:05:24

- m.c method of contraception worldwide
- Permanent method
- 1st performed by Dr. J. Blundell

Procedure

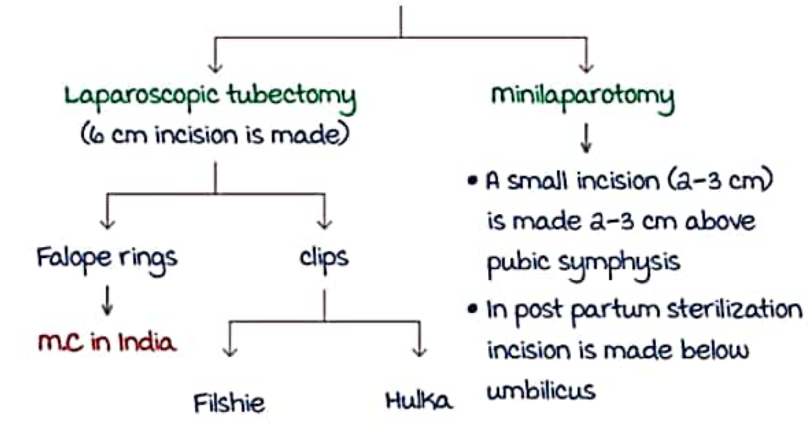
- A loop is made out of fallopian tube followed by ligation & cut the tube
- Ligate tube – 2-3 cms away from the angle of tube
- m.c reason for failure – misidentification of structure to be ligated:
  Round ligament ligated instead of fallopian tube
- Avoidance of misidentification – Recognise the tube by fimbriae
- For Recanalisation – methods, of choice is isthmo isthmic anastomosis
- While cutting the tube – At least 1 cm of tube has to be cut
- Recanalisation is best with methods where least possible tube is damaged



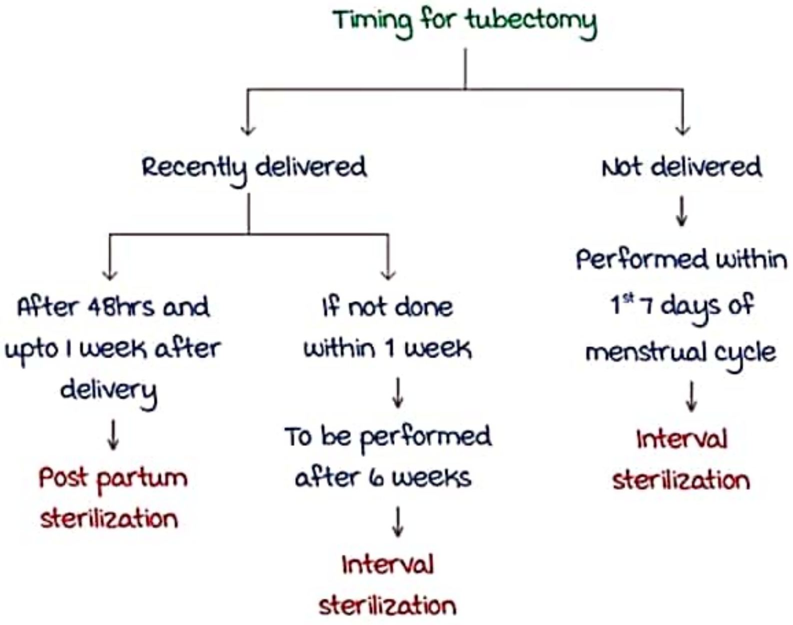
Active space

Methods of tubectomy

00:12:27



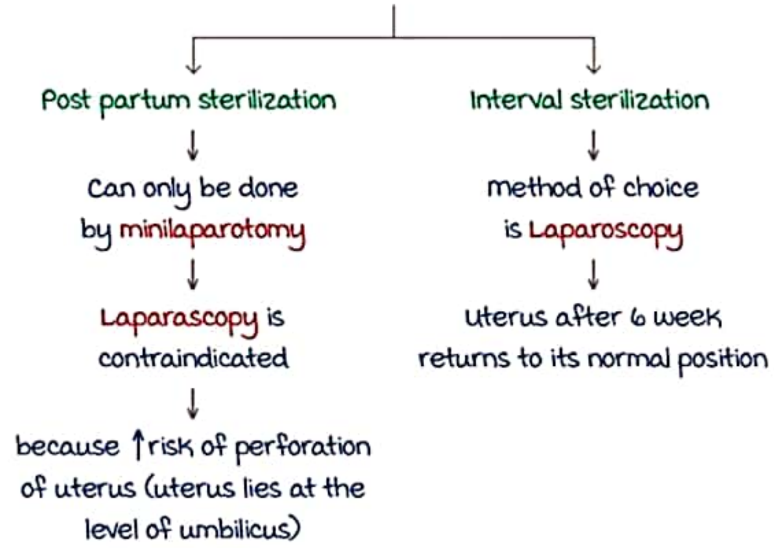
- Laparoscopic tubectomy (6 cm incision is made)
  - Falope rings → M.C in India
  - clips
    - Filshie
    - Hulka
- Minilaparotomy
  - A small incision (2-3 cm) is made 2-3 cm above pubic symphysis
  - In post partum sterilization incision is made below umbilicus



Timing for tubectomy

- Recently delivered
  - After 48hrs and upto 1 week after delivery → Post partum sterilization
  - If not done within 1 week → To be performed after 6 weeks → Interval sterilization
- Not delivered → Performed within 1st 7 days of menstrual cycle → Interval sterilization

Post partum sterilisation and interval sterilisation



- Post partum sterilization → Can only be done by minilaparotomy → Laparoscopy is contraindicated → because ↑risk of perforation of uterus (uterus lies at the level of umbilicus)
- Interval sterilization → method of choice is Laparoscopy → Uterus after 6 week returns to its normal position

- m.c method used for sterilization – Laparoscopy
- m.c method used for postpartum sterilization – mini laparotomy

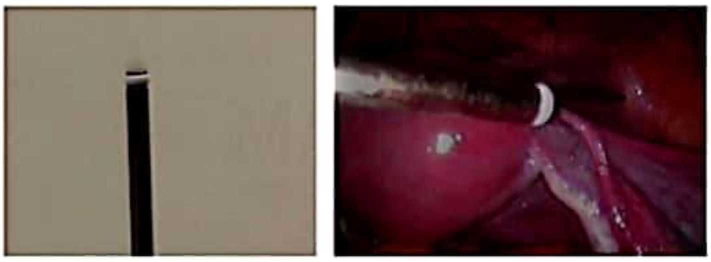
Laparoscopic sterilisation 00:21:00

- Gas → CO_2 or (N_2O)
- Pressure → 8-12mmHg → Never ≥ 15 mmHg
- maximum volume of gas → 2 L
- Instrument → used to create pneumoperitoneum → veress needle

Two methods

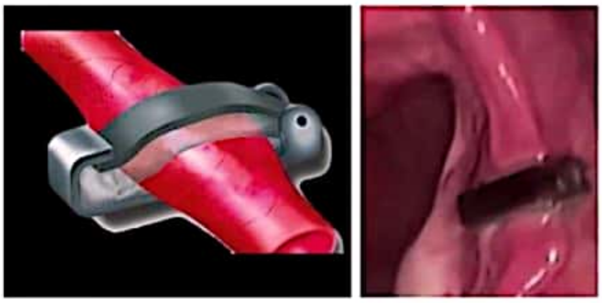
- Falope ring
  - m.c in India
  - To be placed at junction of proximal 1/3rd and middle 1/3rd of Fallopian tube
  - Damage to fallopian tube – 3 cm
- Clips
  - Preferred in young females (may require recanalization later on)
  - Preferred if tubectomy is done after abortion (tubes are edematous)
  - Damage to tube : 4-5 mm → Hence, best suited for recanalization

Laproscopic tubal ligation using falope rings



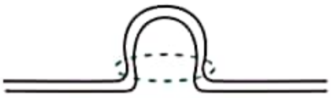
Laparoscopic ligation

Filshie clip – made of outer titanium and inner sialistic material



Minilaparotomy – techniques 00:27:14

Pomeroy's method



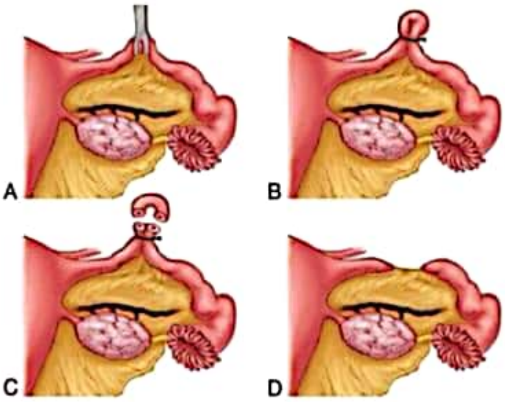
1) A loop of tube is made at isthmus part
2) Single ligature is done – using catgut (absorbable suture)
3) The loop is cut – using metzenbaum scissors

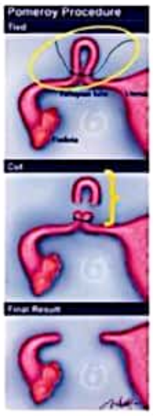
- The tube is held with – Babcock's forceps
- Failure rate – 0.4%

Pomeroy method

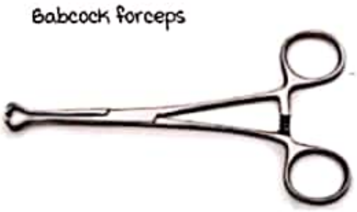
- Babcock's forceps
- Catgut suture
- Difficult in tubal adhesion

Active space





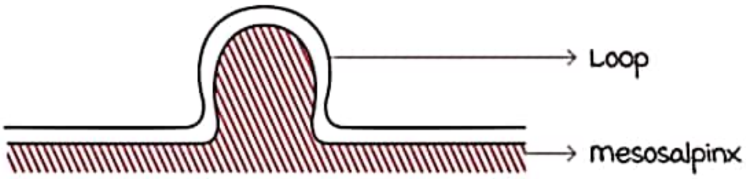
Babcock forceps



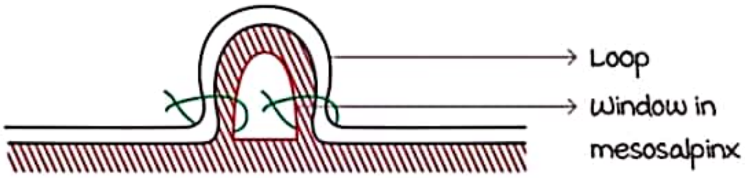
metzenbaum scissors

Limb part is long compared to cutting part

Minilaparotomy – modified pomeroy's method 00:31:33



1) A loop is made at isthmus part of tube

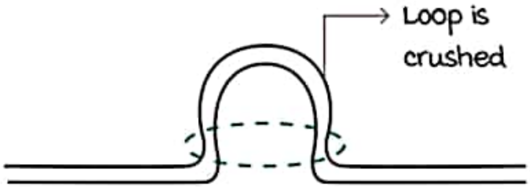


2) A window is created in mesosalpinx followed by two ligatures placed at proximal and distal ends of the loop

- Double ligature
- Loop at – Sent for HPE (Histopathological examination)
- Failure – 0.2%
- M.C used method for tubectomy
- A/K/A Parkland's method

Madlener's technique and uchida technique 00:34:45

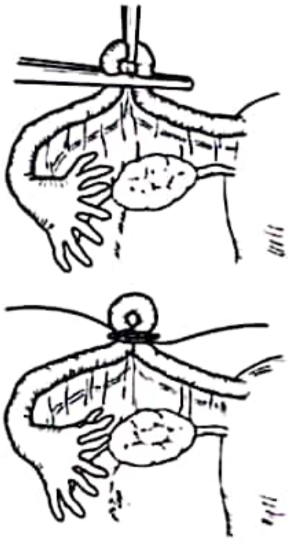
madlener's technique:



1) A Loop is created
2) Single ligature placed
3) The loop is crushed

- It is outdated – due to high failure rate

Active space

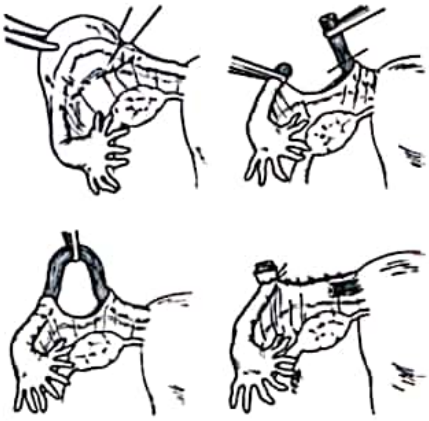


Uchida technique

- Success rate is high
- Step A – A solution of Normal saline and epinephrine is injected into the serosa of Fallopian tube, as a result – the serosa swells

  ↓

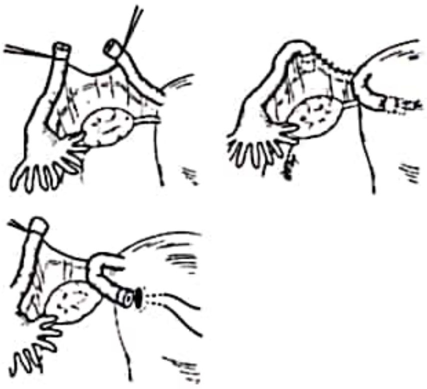
  Incision – given on serosa over the anti-mesentric border
- Step B – muscular part of the tube isolated using Babcock forceps
- Step C – Fallopian tube is cut
- Step D –
  - The proximal end is tied and left inside the serosa
  - The distal end is stitched with serosa in a purse string manner



Irving method, Kroener's fimbriectomy, Aldridge's fimbriectomy

00:39:10

Irving method



Step A – Tube cut at isthmo – ampullary junction

Step B – A tunnel is made in the myometrium into which the proximal part of the fallopian tube is buried. Distal part of the fallopian tube is attached to the broad ligament of uterus (Sutured along)

Kroener's fimbriectomy

- Double ligature at fimbrial end of fallopian tube followed by cutting of fimbrial end
- No longer used

Aldridge's fimbriectomy

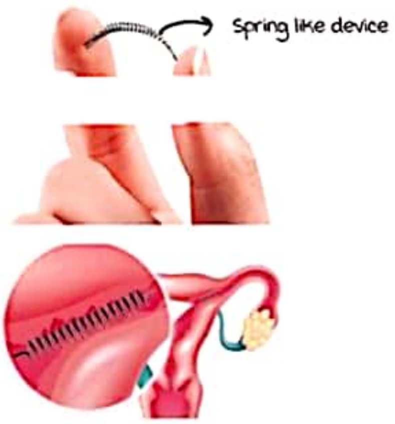
- modification of Kroener's
- Double ligature at fimbrial end of fallopian tube
- Fimbriae placed posterior to peritoneum & sutured with broad ligament
- No longer used
- Least failure rate- Cautery > Uchida > Irving >modified Pomeroy's > Pomeroy's

- Chances of recanalisation – Clips > Falope rings > Pomeroy's > modified Pomeroy's
- Cautery – Least failure rates
  No longer used – because damages adjacent tissues ↑ risk of ectopic pregnancy

Essure device

44:50

- Spring like device
- Inserted into fallopian tube – intramural part
  ↓
  Via hysteroscope
- It has – Outer cylinder, inner cylinder
  ↓ ↓
  Nickel and titanium stainless steel
- Mechanism of Action
  ↓
  Irritates fallopian tube
  ↓
  Initiates tissue reaction
  ↓
  Inflammation → Blocks tube
- It takes 3 months for essure to act – so backup method is needed
- After 3 months – perform Hysterosalpingography
  ↓
  To confirm B/L blockade of tube
- Success rate – 99%

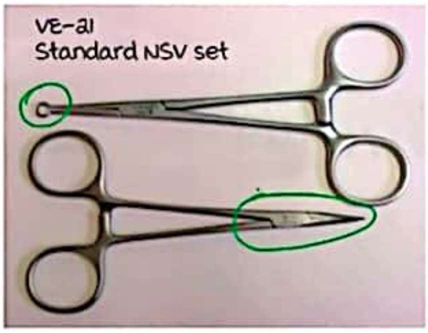


Male sterilisation – vasectomy

00:48:27

Non scalpel vasectomy

- It is done using – Two instruments
  - Ring clamp
  - Dissecting clamp



Procedure

- Done under local anesthesia
- Step-1 → Identify and immobilize the vas deferens using ring clamp

↓

With help of dissecting clamp – puncture the skin

↓

Through that puncture – vas deferens taken out

↓

Hold the vas deferens with ring clamp

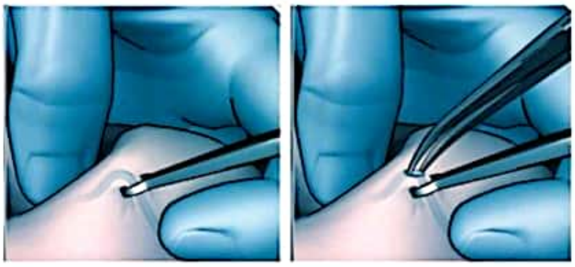
↓

With the help of dissecting clamp – cut the vas deferens

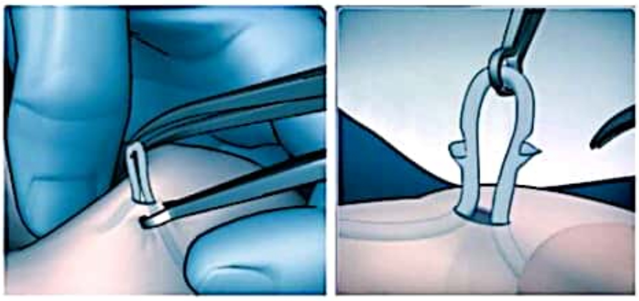
↓

Both the ends are ligated and Put back in place

Non scalpel vasectomy steps



Non scalpal vasectomy steps



- Failure rate – 0.1%
- Reversal of vasectomy – microsurgery (vasovasostomy)

↓

Fertility-90% Pregnancy-70%

- male does not become sterile immediately after vasectomy

↓

So, additional contraceptive used for
15-20 ejaculations or 3 months

↓

Perform – semen analysis

↓

If azoospermia – is confirmed

↓

No additional contraceptive is required

Emergency contraception

00:54:55

- After unprotected intercourse

↓

If taking contraceptives

↓

Known as Emergency contraception / Interceptives

- mechanism of Action

↓

Hormonal

↓

- Inhibit ovulation
- Inhibit fertilization
- Inhibit Implantation

Non hormonal

↓

Spermicidal

- Emergency contraceptives (EC) are not abortifacient
- Never interrupt with early pregnancy
- Never interrupt with placental functioning

- Best time to take EC – within 72 hours of unprotected intercourse
- They can be given till – 120 hours / 5th day of unprotected intercourse

- most effective EC – IUCD (Copper-T)
- most effective hormonal contraceptive – Ullipristal

Emergency contraceptives – drugs 01:00:07

1) Ullipristal
  - It is SPRM – selective progesterone receptor modulator
  - Single dose of 30 mg
  - Trade name – 'Ella'

2) Levonorgestrol (LNG)
  - Total dose – 1.5 mg stat or 0.75 mg – after 12hours → 0.75 mg
  - m.c used EC – LNG
  - EC distributed free of cost by government of India – LNG (E pill)

Other drugs used as EC

1) Centchroman
  - 2 tablets of centchroman (60 mg) → After 12hrs → 2 tablets

    Failure rate 1%

2) Oral contraceptive pills
  - Yuzpee method
  - Total dose – 100mcg ethenylestradiol (EE) + 1mg progesterone

$$\Big\downarrow \text{ after 12 hours}$$

Repeat 100 mcg EE + 1mg progesterone

- For high dose pill – 2 tablets $\xrightarrow{\text{12 hours}}$ 2 tablets
- For low dose pill – 4 tablets $\xrightarrow{\text{12 hours}}$ 4 tablets
- For very low dose pill – 5 tablets $\xrightarrow{\text{12 hours}}$ 5 tablets

3) mifepristone
  - 10 mg – Single dose

Drugs not used as EC
  1) misoprost
  2) Progesterone only pill
  3) mirena

BASICS OF PREGNANCY

Duration of pregnancy 00:00:13

Duration: 9 months + 7 days
OR
40 weeks
Or
280 days

} From 1st day of last menstrual period (LMP)

- If delivery < 37 weeks = Preterm labour

  If delivery ≥ 42 weeks = Post term labour
  (294 days)

- Term delivery: 37 weeks to 41 weeks + 6 days

Early term	Term	Late term
37w – 38w + 6d	39w – 40w + 6d	41w – 41w + 6d

Calculation of EDD 00:03:35

- Naegle's formula:

  EDD = 1st day of LMP + 9 months and 7 days

- Naegle's formula is for 28 days cycles

- Example: Suppose, 1st day of LMP is 15 march

Cycle length=28	Cycle length > 28	Cycle length < 28
EDD = 15 march + 9 months = December Date + 7 days = 15 + 7 = 22nd dec	EDD=22nd Dec Add difference between cycle length and 28 eg: if 30 days EDD = 22nd Dec + (30-28) = 24th Dec	EDD = 22nd Dec Subtract difference between cycle length and 28 Eg: if 25 days, EDD = 22nd Dec – (28-25) = 19th Dec

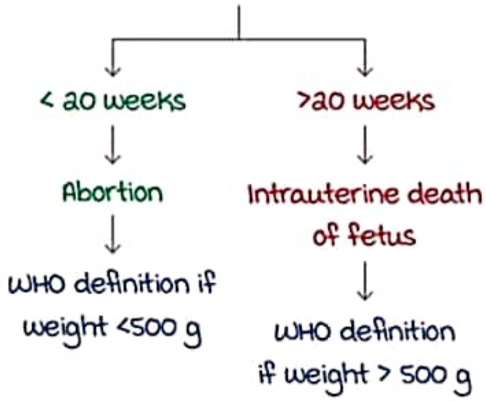
Active space

- Only 4% of females actually deliver on EDD
  50% females deliver either 1 week before or 1 week after EDD

Period of viability 00:11:05

- US = 20 weeks
  India = 28 weeks
  WHO = 24 weeks

- Abortion:
  When pregnancy loss occurs



< 20 weeks → Abortion → WHO definition if weight <500 g

>20 weeks → Intrauterine death of fetus → WHO definition if weight > 500 g

Gravida and parity 00:15:22

- Gravida: Number of times a female has conceived
  Present pregnancy is included
- Parity: Number of pregnancy beyond 20 weeks
  Present pregnancy is not counted
- Twins / Triplets are taken as a single pregnancy
- 1st method: $G_x P_a$

  x-no. of times of conception
  a-no. of pregnancy > 20w

- Examples
  - case 1: A pregnant female @ 24 weeks has history of 1 full term live baby @ 37 w

    Answer: $G_2 P_1$
  - Case 2: A pregnant female @ 30w has history of twin delivery @ 36w 5 years back and history of abortion 2 years back

    Answer: $G_3 P_1$

- 2nd method: $G_x P_{a+b}$ A – no. of pregnancy > 20w
  B – no. of abortions

- Examples
  - Case 1: $G_2 P_{1+0}$
  - Case 2: $G_3 P_{1+1}$

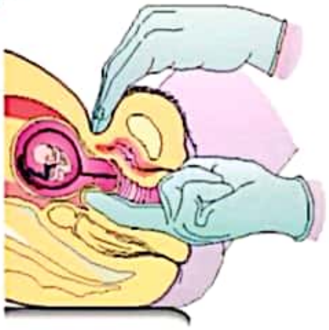
- 3rd method : $G_x P_{a+b+c+d}$
  - Also called as GTPAL system

a–no: of Term deliveries
b–no. of Preterm deliveries
c–no. of Abortions
d–no. of Live births

Signs of pregnancy

00:26:12

- Signs of early pregnancy
  - Goodell's sign: Earliest sign
    Softening of cervix at 6 weeks
  - Hegar's sign:



Softening of the lower part of the uterus on bimanual examination. It is seen at 6–10 weeks. This is because the products of conception are limited to the upper part of uterus. It is the second sign

The following signs are positive at 8 weeks
  - Osiander sign: Pulsations can be felt in the lateral fornix of vagina
  - Jacquemier's sign or Chadwick sign: Bluish discolouration of vagina during pregnancy
  - Piskacek sign: Asymmetrical enlargement of uterus in early pregnancy due to lateral implantation
  - Palmer's sign: Feel regular rythmic contraction of uterus

- Signs of pregnancy:
  - Presumptive signs: Symptoms felt by the patient
    Eg: Amenorrhea, morning sickness, increased urinary frequency
  - Probable signs: Felt by the examiner but is not diagnostic
    Eg: All early signs of pregnancy
  - Positive / absolute signs: 100% patient is pregnant

    1. Feel fetal movements / fetal parts : quickening is the perception of fetal movements by the mother. Fetal parts are felt at 20 weeks
    2. Hear fetal heart sounds → Stethoscope = 18-20 weeks
       → Doppler = 10 weeks
    3. USG evidence of pregnancy
    4. If on x-ray, fetal skeleton can be seen
       Note: x-ray is contraindicated in pregnancy

- Pseudocyesis / False pregnancy
  - Patient is not pregnant but believes she is pregnant
  - None of the positive signs of pregnancy is seen

Antenatal visits 00:37:14

- Ideal number of visits:
  - Till 28 weeks = Once/month
    28-36 w = Twice/month
    > 36w = Every week
    Total = 12-15 visits
- WHO recommends atleast 4 visits
- Government of india recommends atleast 3 visits
  1st → 20 weeks
  2nd → 32 weeks
  3rd → 36 weeks
- Caloric requirement in pregnancy = + 350 Kcal/day
  - Trimester wise, I trimester = + 0 Kcal/day
    II trimester = + 350 Kcal/day
    III trimester = + 450 Kcal/day

- Requirement for moderately active female = 2200 Kcal/day
  Total caloric requirement = 2200 + 350
  = 2550 Kcal/day

Vaccination in pregnancy

00:40:52

- All live vaccines are contraindicated in pregnancy
- All killed vaccines can be given in pregnancy
- Vaccines that are absolutely safe
  - H → Hepatitis A/B
  - I → Influenza
  - T → Tetanus toxoid
  - R → Rabies vaccine
- Vaccines that can be given in special circumstances (during epidemics)
  - Tab → Inactive typhoid vaccine
  - P → Pneumococcus
  - C → Cholera
  - m → meningococcus
- Vaccines given if pregnant female is travelling to endemic area
  - Yellow fever
  - Inactive polio vaccine
- Vaccines absolutely contraindicated
  - mmR
  - Small pox
  - Chicken pox
  - BCG
  - Herpes zoster
  - HPV

  → Atleast one month is needed after taking these vaccines before she can conceive
  ↓
  If pregnant within 1 month, then MTP is not required

Active space

MOLAR PREGNANCY : GESTATIONAL TROPHOBLASTIC NEOPLASIA

Gestational Trophoblastic Neoplasia (GTN) - diagnosis 00:00:11

Diagnosed if any 1 of the following is present

1. 4 Consecutive values of hCG shows plateau [≤ 10%] on Day 1, 7, 14, 21
2. 3 consecutive [D_1, D_7, D_{21}] β-hCG values [>10%]
3. On Histopathological examination – Choriocarcinoma
4. hCG level remains high even after 6 months of suction evacuation
   [Normally, partial mole – normal hCG by 7 weeks
   Complete mole – normal hcG by 9 weeks]

Gestational Trophoblastic Neoplasia (GTN) – presentation 00:02:54

1. Continuous bleed per vagina even after evacuation
2. Shock [in case of invasive mole]
3. Uterine sub involution
4. Persistence of theca lutein cyst
   [Normally, disappears after 2-4 months of evacuation]
5. metastasis
   [more common site ⇒ Lungs > vagina > pelvis]

Note:

A: most common GTN after molar pregnancy – Invasive mole
↓
- Also known as chorioadenoma destrusens
- Invades myometrium ⇒ Hysterectomy
- Chorionic villi present

B. Choriocarcinoma most commonly develops after molar pregnancy
- A low risk choriocarcinoma

C. High risk choriocarcinoma more commonly develops after full term delivery

D. most common GTN to develop after full term delivery ⇒ Choriocarcinoma

Choriocarcinoma 00:11:25

- Tumor marker – β hCG
- most common route of metastasis – Hematogenous
- most common site of metastasis– Lung > vagina > pelvis (75%)

Lung metastasis in choriocarcinoma
- Occurs in stage 3
- X -ray appearance

most common ⇓ Cannon ball appearance

2nd most common ⇓ Snow storm appearance

- Snow storm appearance

On ultrasound ⇓ Complete mole

On chest X-ray ⇓ Lung metastasis in choriocarcinoma

Vaginal metastasis in choriocarcinoma
- Occurs in stage 2
- most common site of metastasis ⇒ Just below the urethra ↓ [Suburethral metastasis]

WHO score for choriocarcinoma 00:16:17

	Low Risk	High Risk
1. Age of patient	≤ 39 yrs	≥ 40 yrs
2. hCG levels	< 10^3 IU	≥ 10^5 IU
3. Type of antecedent pregnancy	molar pregnancy	full term delivery
4. Duration of antecedent pregnancy	< 4 months	> 12 months
5. metastasis	Lung	Liver/Brain
6. Number of metastasis	< 4	> 8
7. Size of tumor	< 3 cms	> 5 cms
8. History of chemotherapy	No	multiagent chemotherapy

Active space

- Total score = ≤6 ⇒ Low risk
- Total score = ≥7 ⇒ High risk

Treatment

- Choriocarcinoma are chemosensitive tumors
- In case of
  - Low risk choriocarcinoma ⇒ Single agent chemotherapy-methotrexate
  - High risk choriocarcinoma ⇒ multi agent chemotherapy - Bagshaw regime
    - E - Etoposide
    - M - methotrexate
    - A - Actinomycin
    - C - Cyclophosphamide
    - O - Oncovin

Follow up

- Low risk ⇒ follow up x 1 year
- High risk ⇒ follow up x 2 year [check β hCG level]

Difference between choriocarcinoma & placental site trophoblastic tumor (PSTT)

00:24:20

Choriocarcinoma	PSTT
1. most common	1. Rare
2. most commonly develops after H.mole	2. most commonly after full term pregnancy
3. Tumor marker- β HCG	3. Tumor marker HPL>Placental Alkaline phosphatase ↓ [Human placental lactogen]
4. Histopathological examination [HPE] - Dimorphic cells - Excessive hemorrhage & necrosis	4. HPE monomorphic cells Less hemorrhage & necrosis
5. Chemosensitive	5. Chemoresistant
6. Treatment of choice (TOC) - Chemotherapy	6. TOC - Hysterectomy

Active space

RH ISOIMMUNIZATION: MANAGEMENT

Category –1 RH negative pregnancy

00:00:20

Rh –ve pregnant woman at ANC

↓

Ist Investigation: Husband's Rh – Status

↓

If husband is Rh +ve

↓

Indirect Coombs test (ICT) on mother's blood
at 12, 20, 28 weeks

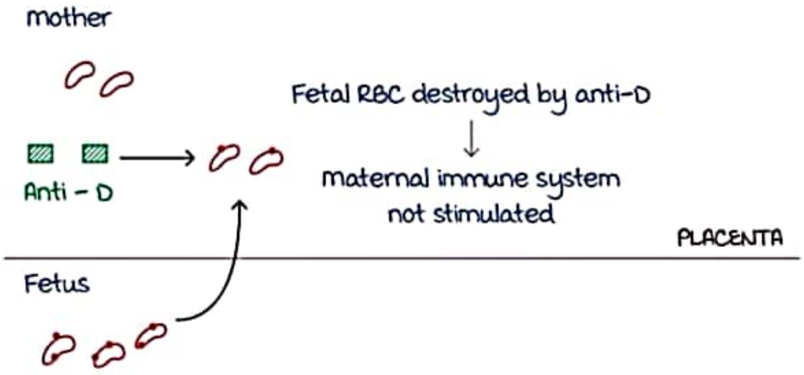
↓

If negative: mother not yet
sensitized (no antibody)

↓

Administer Anti- D to mother
at 28 – weeks of pregnancy
Antepartum prophylaxis

mechanism:


mother
Fetal RBC destroyed by anti-D
maternal immune system
not stimulated
Anti – D
PLACENTA
Fetus

300 mcg of Anti – D → Hemolyse 15ml of fetal blood

If ICT +ve

↓

maternal immune system stimulated

↓

Anti – D is of no use

↓

Classified as → Category 2: Rh isoimmunised pregnancy

One – liners:

1. Rh antigen develops → 30–40 days after fertilization (7.5 weeks of pregnancy)

2. Maximum chance of fetomaternal haemorrhage (FMH): Beyond 28 weeks

3. 0.1 ml fetal blood (minimum requirement to stimulate maternal immune system)

4. Anti – D prophylaxis → Effective for 12 weeks

5. Antepartum prophylaxis: Dose of anti – D

↓

300 mcg (1500 IU)

↓

Neutralize 15ml of fetal blood

[100 mcg anti – D → neutralize 4 ml of fetal blood]

Anti – D after delivery:

Post-partum prophylaxis

↓

Dose of anti – D calculated based on amount of fetal blood in maternal circulation

15 ml fetal blood – 300 mcg (1500 IU)

4 ml fetal blood – 100 mcg (500 IU)

- For every ml of fetal blood above 4ml (500IU)

  ↓

  Give 125 IU of anti – D (polyclonal antibody)

- Intra – muscular injection → Deltoid or Anterolateral aspect of thigh

Category 2 Rh negative pregnancy

00:16:13

- A/K/A Rh isoimmunised pregnancy
- ICT +ve (at any time pregnancy)
- No role of prophylaxis anti – D administration

- maternal immune system stimulated and producing antibodies

↓

Determine antibody titre

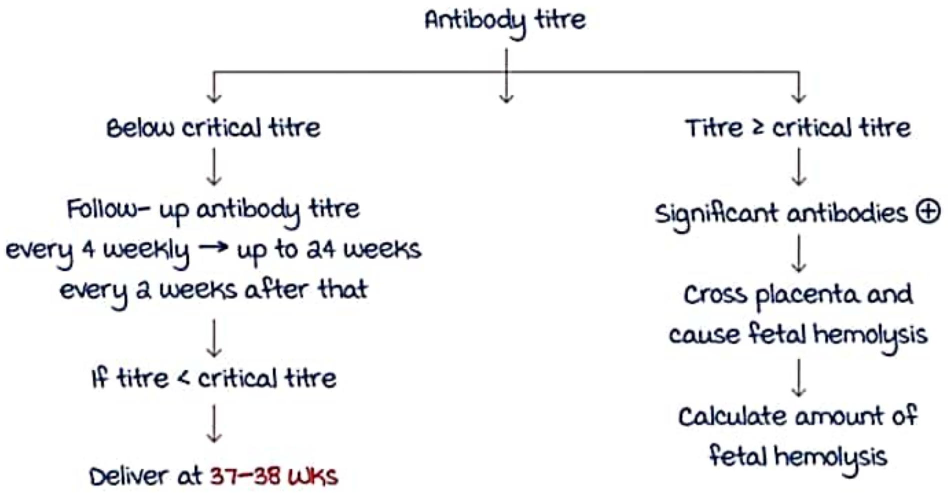
Antibody titre:

1 : 16 → Critical titre

i.e significant antibodies present

↓

will cross placenta and cause fetal hemolysis


Antibody titre
Below critical titre
Follow- up antibody titre
every 4 weekly → up to 24 weeks
every 2 weeks after that
If titre < critical titre
Deliver at 37–38 wks
Titre ≥ critical titre
Significant antibodies ⊕
Cross placenta and
cause fetal hemolysis
Calculate amount of
fetal hemolysis

To calculate fetal hemolysis

1. Amniocentesis

2. Doppler of middle cerebral (MCA) → Peak systolic velocity

Active space

Amniocentesis:

- Fetal hemolysis → ↑ bilirubin → excreted in amniotic fluid
- Collect amniotic fluid in dark – coloured bottle

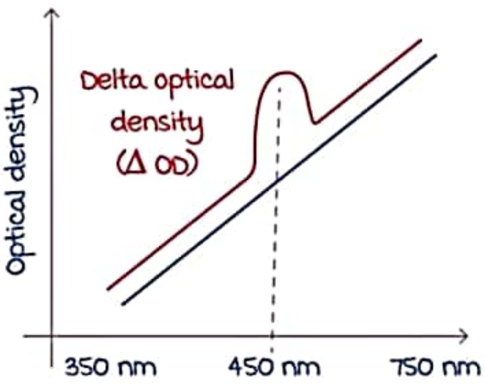
↓

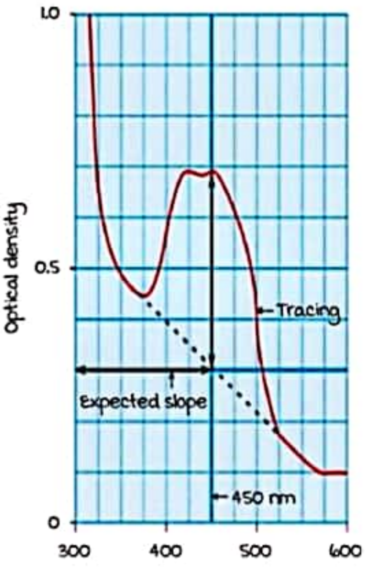
Spectro photometric analysis
measure optical density of fluid between
350 – 750 nm.

↓

Bilirubin absorbs light at 450nm.

Bulge at 450 nm – bilirubin





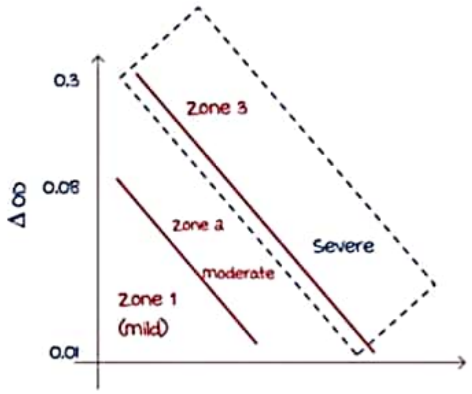
Δ OD: height of bulge → level of bilirubin.

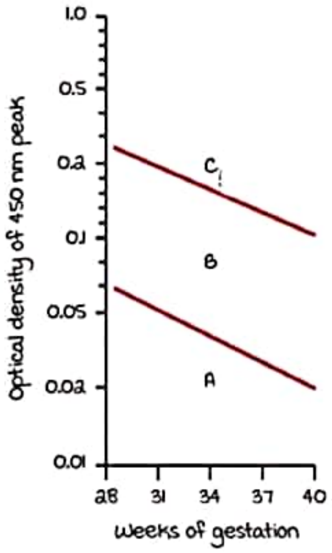
Bilirubin → bulge at 450 nm
meconium → bulge at 410 nm
Blood → bulge at 412 nm

Liley's graph

00:29:10

1. Liley's graph → plotted after 27 weeks.





Zone 1 : mild : Amniocentesis every 4 weekly.

Zone 2 : moderate : Amniocentesis every 2 weeks.

Upper part of zone 2 + zone 3 → Severe disease

Pregnancy < 34 weeks → Inutero blood transfusion

≥ 34 weeks → Delivery

2. Robertson graph: 12 zones

3. Queenan graph:

Advantage → From 14 weeks onwards.

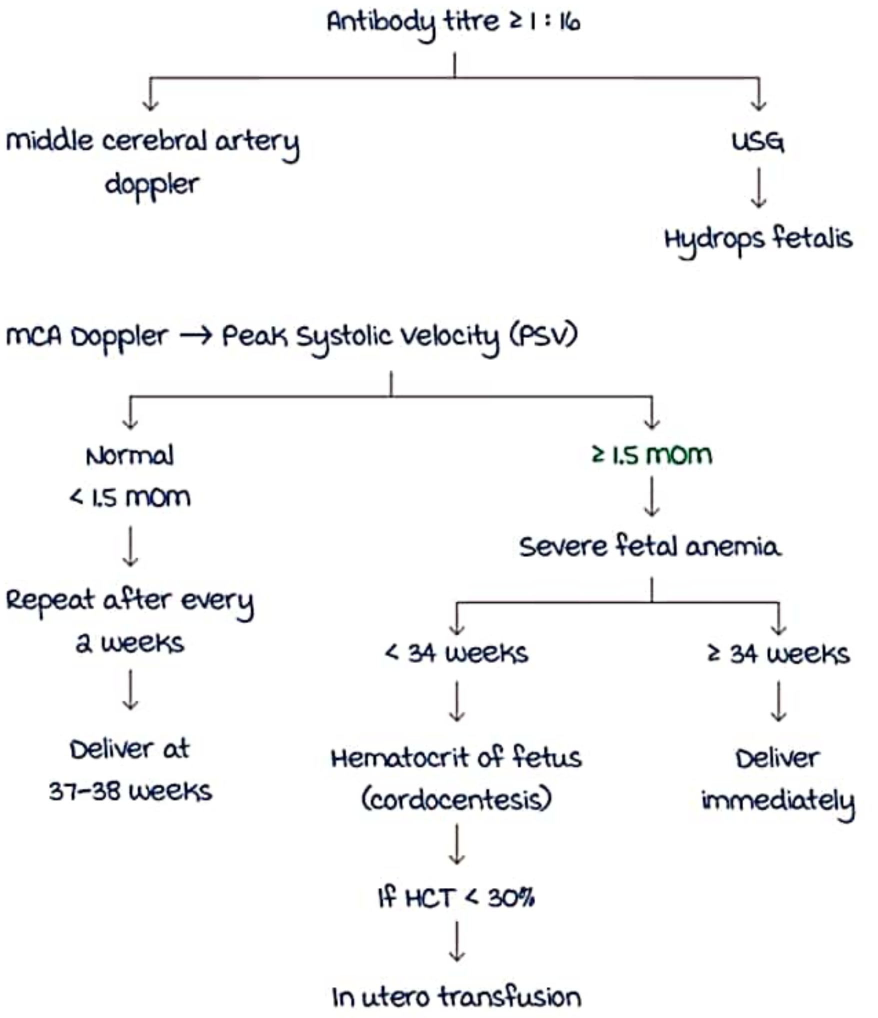
Now, middle cerebral artery (MCA) Doppler is used

Active space

Leave Feedback

MCA doppler

00:33:44


Antibody titre ≥ 1 : 16
middle cerebral artery doppler
USG
Hydrops fetalis
MCA Doppler → Peak Systolic Velocity (PSV)
Normal
< 1.5 MOM
Repeat after every 2 weeks
Deliver at 37-38 weeks
≥ 1.5 MOM
Severe fetal anemia
< 34 weeks
Hematocrit of fetus (cordocentesis)
If HCT < 30%
In utero transfusion
≥ 34 weeks
Deliver immediately

I. Pregnancy terminated at 37 – 38 weeks when:

1. PSV in MCA Doppler < 1.5 MOM
2. If Critical titre of antibody < 1:16

II. Pregnancy terminated at 34 weeks when:

1. Hydrops fetalis on USG
2. Amniocentesis → Delta OD between upper zone 2 and zone 3
3. PSV in MCA Doppler ≥ 1.5 MOM

Active space

Category 3 RH negative pregnanacy

00:39:38

Rh negative woman

↓

h/o hydrops fetalis
in previous pregnancy

↓

Directly monitor PSV in
MCA Doppler
(no need to monitor antibody titre)

Delivery in Rh –ve patient

- Vaginal delivery (C-Section: only for obstetrical indications)

After delivery:

1. Inj. methyl ergometrine contraindicated
2. Early cord clamping
3. Tests on fetus:
   Rh status of fetus
   Bilirubin
   Hematocrit
   Direct Coomb's test

If fetus is Rh +ve
and direct coombs test (DCT) is –ve

↓

Administer Anti – D to mother within
72 hours of delivery

↓

postpartum prophylaxis
(protect subsequent pregnancies)

- Anti – D can be given upto 28 days

- Dose of anti – D: 300 mcg (1500 I.U)

↓

Neutralize 15ml of fetal blood

Tests after Rh negative delivery

00:39:38

After delivery, calculate fetal blood in maternal circulation

RCOG Guideline: Rosette test within 2 hrs of delivery

Positive
↓
Fetal blood $\geq$ 15 ml
↓
Kleihaeur Betke Test
(Quantitative test)

Negative
↓
Fetal blood < 15 ml
Dose of anti-D
- 300 mcg

Principle : HbF → resistant to acid and alkali

HbA → sensitive to acid and alkali

Reagent : Citric acid phosphate buffer.

Procedure :

Reagent + maternal blood → Ghost cells
(maternal RBCs hemolyse)
i.e RBCS elute
∴ Test a.k.a. Acid elution test

If fetal blood ⊕ in sample
↓
HbF does not hemolyse
↓
Fetal RBC ⊕ on microscopy
↓
Study 25 high power field (HPF)

- Fetal blood (ml) $= \dfrac{\text{Fetal RBC / HPF}}{\text{maternal RBC / HPF}} \times 2400$
- Calculate does of anti - D

500 IU → 4 ml fetal blood

For every ml beyond 4 ml → add 125 IU anti - D

- Singers alkali denaturation test / Apt test
  - Differentiate between fetal blood and maternal blood
  - Quantitative test.

Kleihaeur betke test: differentiate between fetal and maternal RBC

Anti – D also given to Rh – ve women after:

Ectopic pregnancy.
Molar Pregnancy.
Chorionic villi sampling.
Amniocentesis
Antepartum haemorrhage
Attempting version
Abdominal trauma
Abortion

↓ < 12 wks
(1st trimester)
- All abortion except threatened and complete → anti – D given

↓ ≥ 12 weeks
Give anti – D to all abortions

Dose: < 12 weeks: 50 mcg
≥ 12 weeks: ACOG → 300 mcg
RCOG → 100 mcg

ANATOMY OF FEMALE GENITAL TRACT : VAGINA

- Vagina:
  - Fibromuscular canal connecting cervix to introitus
  - Posterior wall longer than anterior wall
  - 4 fornices → Anterior, posterior & 2 lateral

    Anterior fornix : Shallowest

    Posterior fornix : Deepest

- Cervix and lateral fornix of vagina are related to:
  1. Uterine artery
  2. Ureter
  3. Cardinal / mackenrodt's ligament

- Vagina has no glands

  Vaginal discharges → Endocervical glands
  Endometrial glands
  Bartholin glands (only at time of intercourse)

- Cervical discharge → Alkaline (6-8)

Doderlein bacilli and pH of vagina 00:05:20

- Vagina has inhabitant bacteria

  ↓

  Doderlein bacilli (Lactobacilli)

  ↓

  Convert glycogen to lactic acid

  ∴ vaginal pH → Acidic

Doderlein bacilli → Present at birth

↓

Disappear after 10 days

↓

Reappear at puberty

↓

Disappear at menopause

Leave Feedback

Age	Vaginal pH
• At birth / New born female	Acidic
• Childhood (before puberty)	6-8
• At puberty	pH changes from alkaline → Acidic
• At reproductive age	4.5
• At menopause	6-8
• At pregnancy	3.5
• During menstruation (blood: Alkaline)	6-8

Lining epithelium of vagina

00:11:34

Stratified squamous epithelium (non-keratinised)

- In newborn → Vagina lined by transitional epithelium

Blood supply:

Upper ⅓ : Descending cervico-vaginal artery
middle ⅓ : Internal pudendal artery
Lower ⅓ : middle rectal artery

Lymphatic drainage:-

Upper ⅓ : Hypogastric, Obturator, Pre-sacral, & External iliac (HOPE)
middle ⅓ : internal iliac lymph node
Lower ⅓ : superficial inguinal nodes

Nerve supply:

Upper part : S_2-S_4
Lower part : Pudendal nerve

Development of vagina

Upper ⅔rd : Mullerian duct (mesodermal)
Lower ⅓rd : Sinovaginal bulb (Urogenital sinus) (endodermal)

Active space

Broad ligament 00:17:10

Parts of broad ligament:

1. mesosalpinx
2. mesovarium
3. mesometrium

Contents of broad ligament

- Tube structures (2)
  1. ureter
  2. Fallopian tube
  Note: ovary not a content
- 4 ligaments
  A: ovarian
  B: Infundibulo pelvic
  C: Round ligament
  D: Cardinal ligament
- Vestigial structures
  1. Epoophoron
  2. Para-oophoron
  3. Gartner's duct
- Vessels
  a) Ovarian artery
  b) uterine artery

Levator ani 00:22:55

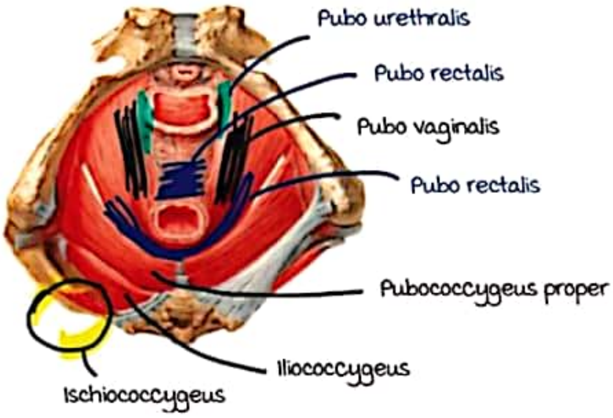
Pelvis is separated from perineum by:

Levator ani muscle
↓
Pelvic diaphragm

Parts
- Pubococcygeus
- Iliococcygeus

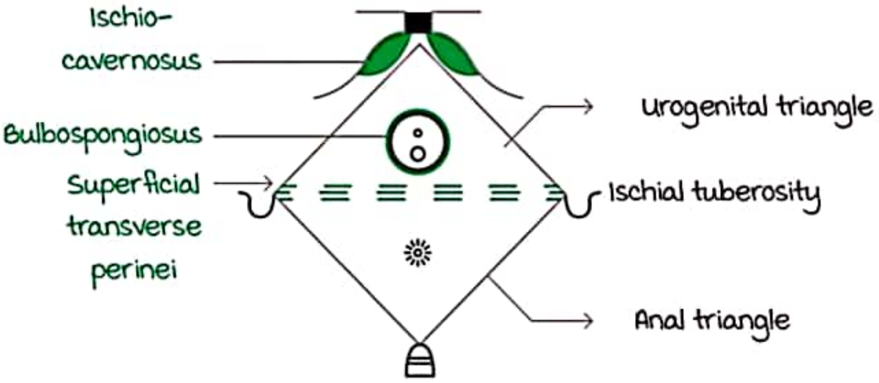
Note: Ischiococcygeus not a part of levator ani

Pelvic Diaphragm of Female
Inferior view


Pubo urethralis
Pubo rectalis
Pubo vaginalis
Pubo rectalis
Pubococcygeus proper
Iliococcygeus
Ischiococcygeus

Perineum

00:27:24


Ischio-cavernosus
Bulbospongiosus
Superficial transverse perinei
Urogenital triangle
Ischial tuberosity
Anal triangle

Urogenital triangle:

Deep perineal pouch →

Superficial perineal pouch →

Superior layer of urogenital diaphragm

Perineal membrane (inferior layer of urogenital diaphragm)

Deep fascia

Superficial fascia

Skin

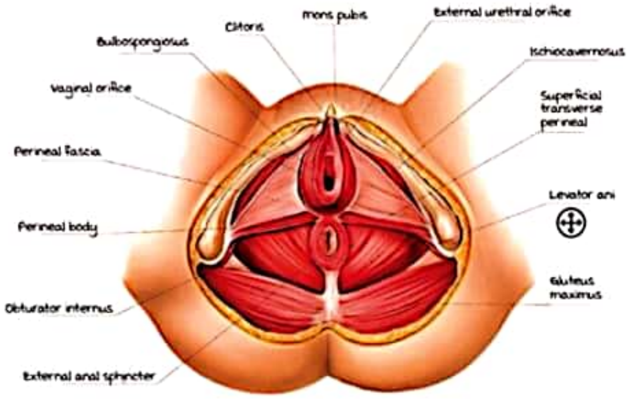
- Deep fascia – aka Colle's fascia

Deep perineal pouch: Deep transverse perinei muscle

Attachments of perineal body:

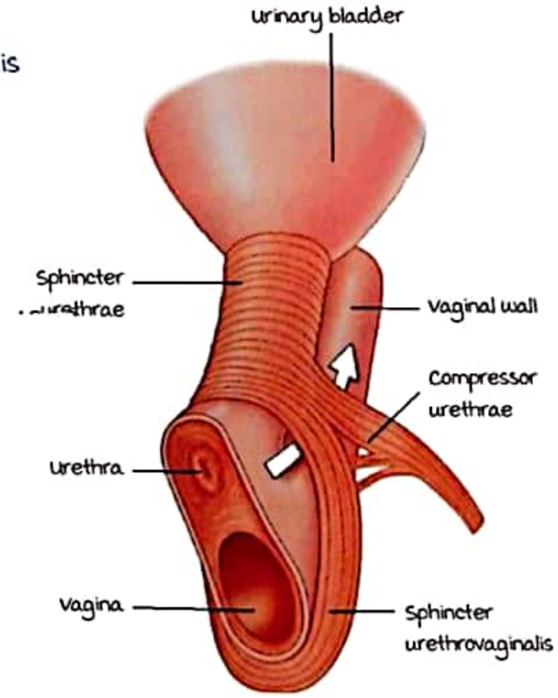
B. Bulbospongiosus (Bulbo cavernosus)
L. Levator ani muscle
E. muscles of external anal sphincter
S. Superficial transverse perinei
S. Sphincter urethrae
D. Deep transverse perinei

Not attached → Ischiocavernosus


Bulbospongiosus
Clitoris
mons pubis
External urethral orifice
Ischiocavernosus
Vaginal orifice
Superficial transverse perineal
Perineal fascia
Levator ani
Perineal body
Gluteus maximus
Obturator internus
External anal sphincter

Parts of sphincter urethrae

1. Compressor urethrae
2. Sphincter urethrovaginalis


urinary bladder
Sphincter urethrae
Vaginal wall
Compressor urethrae
Urethra
Vagina
Sphincter urethrovaginalis